Convention Issue

American Foundryman

The Foundrymen's Magazine

APRIL 1951

Lectromelt

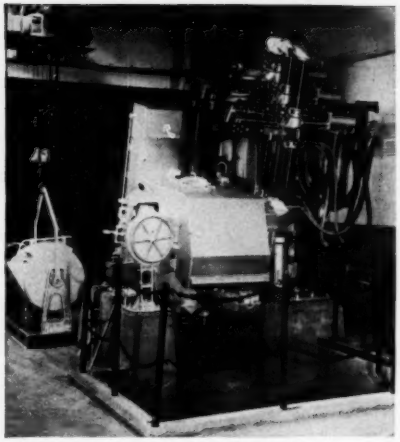
FOR MANUFACTURING RESEARCH AND WHEN YOU SWING INTO PRODUCTION

Capacities of Lectromelt Furnaces range all the way from 25 pounds to 150 tons—sizes and styles to meet every research and production need.

Lectromelt pilot plant furnaces save you money by letting you investigate manufacturing problems in the laboratory. Procedures are worked out there, and then commercial furnaces are built. Thus you know you're right before you make the big investment.

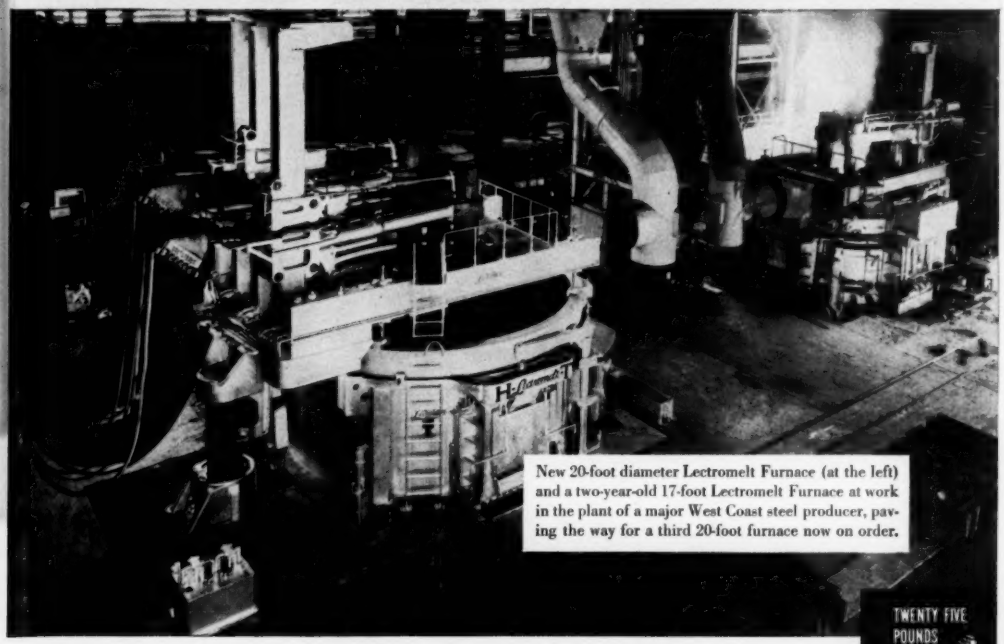
Lectromelt Furnaces are built for HEAVY DUTY. Power transformers, leads, electrode holders, cooling facilities and the furnaces themselves—all were designed for OVERwork. That's why you dare boost melting and output so high with Lectromelt Furnaces.

Whether you're wanting a pilot plant or production furnace, Lectromelt engineers can help determine your requirements. Pittsburgh Lectromelt Furnace Corporation, 316 32nd Street, Pittsburgh 30, Pennsylvania.



This Lectromelt Furnace, rated at 1,000 pounds per hour, is used on manufacturing development work at the new International Harvester Company Laboratories, Chicago.

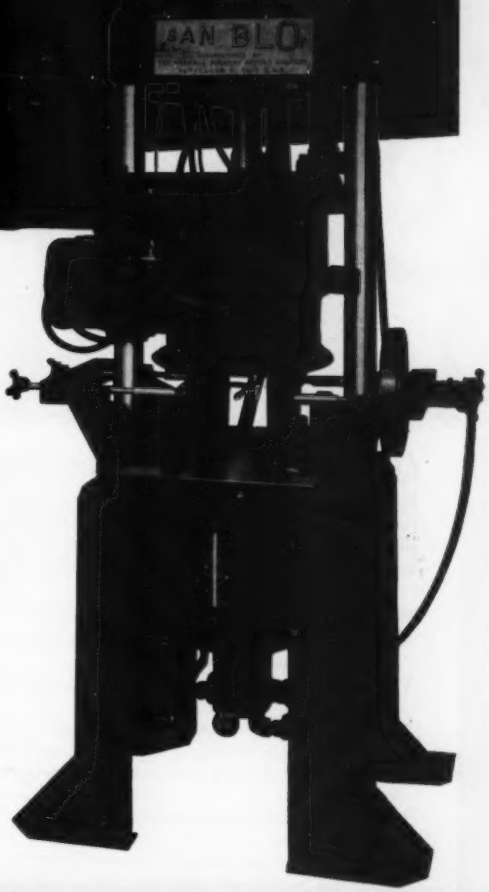
Manufactured in... CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2... ENGLAND: Birlec, Ltd., Birmingham ... SWEDEN: Birlec, Elektrougnar A/B, Stockholm ... AUSTRALIA: Birlec, Ltd., Sydney... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Belge Stein et Roubaix, Brassoux-Liege ... SPAIN: General Electrica Espanola, Bilbao... ITALY: Forni Stein, Genoa.



New 20-foot diameter Lectromelt Furnace (at the left) and a two-year-old 17-foot Lectromelt Furnace at work in the plant of a major West Coast steel producer, paving the way for a third 20-foot furnace now on order.

WHEN YOU MELT... MOORE RAPID Lectromelt

You can now *blow* cores and sand mixtures you've always had to ram before..



With the new

SAN-BLO

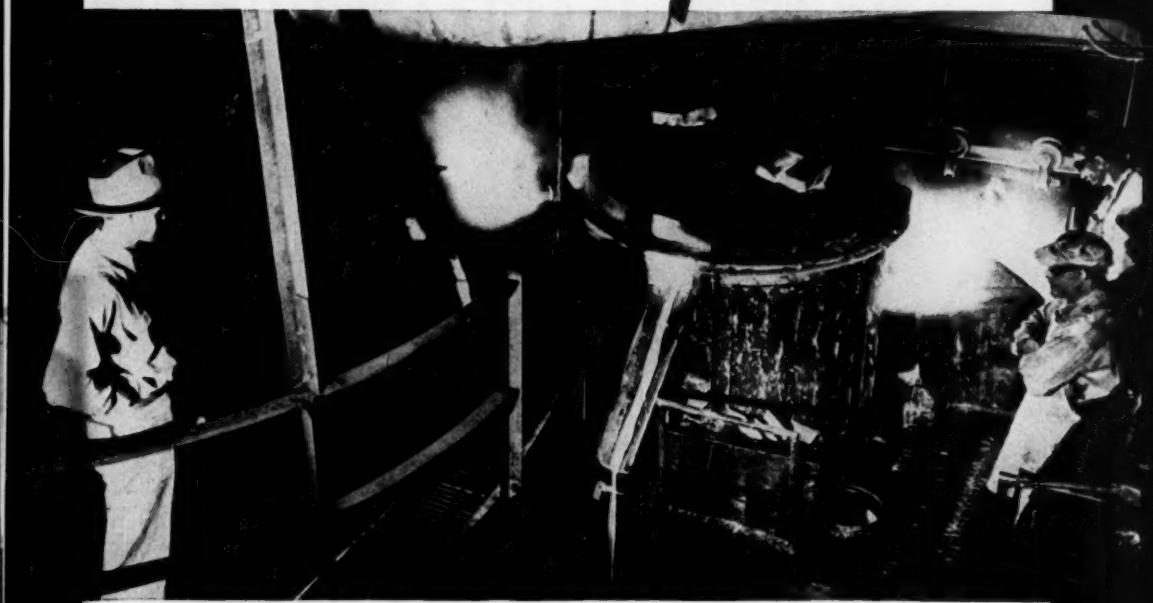
THE ALL-PURPOSE CORE BLOWER!

Forget the limitations on core blowing you've been accustomed to! SAN-BLO operates on a new principle that permits blowing cores and sand mixtures never blown before. Because sand is moved mechanically in the blow head by motor-driven plows, full air pressure is utilized for carrying sand into the core box. So, any sand you can hand ram, can be blown—regardless of binder, green strength or moisture content.

No foundry is too large or too small to use SAN-BLO. It has met the requirements of iron, steel and non-ferrous foundries—of jobbing and production foundries. It is blowing better cores, faster—and reducing core room costs. Chances are excellent that your foundry, too, can use SAN-BLO to advantage. Why not investigate? Send for the new 8-page SAN-BLO booklet—TODAY!

The FEDERAL FOUNDRY SUPPLY Company

Foundries that specialize in Quality Castings flux and desulphurize with PURITE



A modern cupola and forehearth installation used in the manufacture of farm equipment parts and critical machine castings at the Lynchburg Foundry Company, Lynchburg Plant.

Lynchburg Foundry Company—long famed for casting quality farm equipment parts, castings for the chemical industry, critical machine parts and iron pipe—relies on Purite to give increased fluxing action in cupolas and to reduce sulphur in ladle or forehearth.

Here's why so many leading foundries use Purite:

- Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.
- Purite gets to the iron quicker—no faster desulphurizer made.
- Purite is time-tested and proven for unsurpassed desulphurizing uniformity.
- Purite comes in 2-lb. pigs—no weighing or measuring required.
- Purite is 100% fused soda ash—you do not pay for inert materials.
- Purite does not crumble—no waste—no dust.
- Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

sold by all leading foundry supply houses in the United States and Canada.

Nearly 30 years of successful experience prove why Purite is today's outstanding flux and desulphurizer. Get full information on Purite's effectiveness—write today for new booklet, "Refining and Desulphurizing in the Cupola." Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

PURITE 100% fused soda ash.

The Scientific Flux for Better Melting and Cleaner Iron.

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April, 1951

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VOLUME XIX, NUMBER 4

American Foundryman

April, 1951

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A COMPLETE LINE OF *Scientifically* DELTA FOR *Faster Production* OF FINER-FINISH CASTINGS

DELTA products for the foundry are PRODUCTS OF RESEARCH. For nearly twenty years many important scientific developments . . . valuable contributions to the advancement of foundry practices . . . have originated in DELTA'S laboratories where the most modern scientific facilities are employed in a continuing program of product research, development and standardization.

Every DELTA Foundry Product is first tested by laboratory methods then submitted for use and final approval in ACTUAL FOUNDRY PRACTICE before it is identified with the name "DELTA".

There is no "just as good" substitute for ANY Delta Foundry Product just as there is no substitute for DELTA'S scientific controls which safeguard the quality and uniformity of all DELTA Foundry Products.

Among the many "FIRSTS" introduced by DELTA laboratories are Plastic-type Core and Mold Washes and, more recently, a Sand Release Agent (96•B) embodying unique and distinctive characteristics.

DELTA CONTINUES TO LEAD IN THE DEVELOPMENT OF NEW PRODUCTS FOR IMPROVED FOUNDRY PRACTICE.

DEVELOPED FOUNDRY PRODUCTS

CORE AND MOLD WASHES:

FOR STEEL:

Delta Special Core & Mold Wash Base — Used by more steel foundries than all other types of washes combined.

Delta SteelKoat — a finished high fusion waterproof wash.

FOR ALL TYPES OF SAND CAST METALS:

Delta ThermoKoat — It's plasti-lastic, non-heat shocking, highest fusion and hot strength.

Delta Z-Koat — a zirconium wash with unusual properties in contact with molten metal.

FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:

Delta GraKoat — no reaction with molten metal.

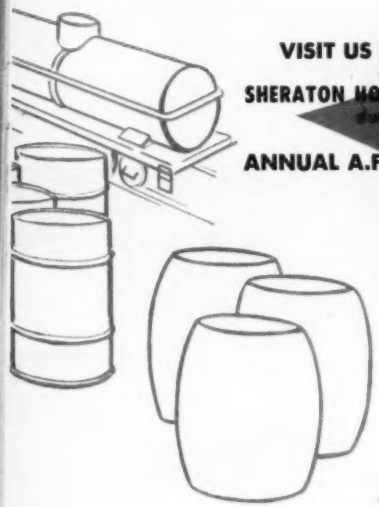
Delta BlacKoat — a black wash, free from carbon, no gas in contact with molten metal.

FOR GRAY IRON:

Delta BlacKoat S-5 — a new and different wash. Produces results, on gray iron castings, unequalled by any other wash.

FOR NON-FERROUS AND LIGHT METALS:

Delta NonferrusKoat — produces unusually smooth surface castings.



VISIT US AT OUR SUITE
at the
SHERATON HOTEL, BUFFALO, N. Y.
during the
55th
ANNUAL A.F.S. CONVENTION

PARTING COMPOUNDS:

Delta Partex — (Nutshell partings) has lycopodium properties, non-injurious and non-hazardous to use.

Delta Liquid Parting — Low-cost, highly effective and lasting.

MUDDING & PATCHING COMPOUNDS:

Delta Sliktite — a light colored mud for all types of metal castings.

Delta Ebony — a black mud for gray iron, malleable and nonferrous work. All mudding compounds seal core joints and hold joints together at high temperatures.

NO-VEIN COMPOUND:

A special compound, not iron oxide. A high hot strength and sand plasticizing material. Stops veins and penetration.

MOLD SURFACE BINDERS—LIQUID:

Delta Spray Binders — Produce dry sand mold results by surface spraying of green sand molds.

DRI-BOND:

A new type of Dry Binder which provides new economies. Fast-baking, reduces veining and penetration. Can be used with old sand equally as well as with new sand.

PERMI-BOND:

Eliminates Sea Coal Nuisance: The new modern scientific sea coal replacement.

BONDITE:

Produces a reducing mold atmosphere:

For Steel and Gray Iron — Use Delta Bondite, a dry binder which becomes waterproof on drying and produces mold atmosphere which is high in reducing gas.

96-B SAND RELEASE AGENT:

Another Foundry *"First"* by Delta. By adding 8 oz. or less per ton to your core or molding sand mixes, your sands will flow freely. 96-B is completely volatile at elevated temperatures and does not contaminate the sand.

CORE ROD DIP OIL NO. 224X:

Ties core rods and wires into the cores:
Rods and wires coated with Delta Core Rod Dip Oil adhere to the sand. Eliminates need for 50% of the rods and wires and reduces core breakage.

DELTA SAND CONDITIONING OIL:

Sticking core sand mixes work freely in core boxes when sand conditioning oil is added to core sand mixes.

CORE OILS:

High tensile, low gas, faster baking, exceptionally economical to use.

Get the Facts . . .

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

Manufacturers of Scientifically Controlled Foundry Products

MILWAUKEE 9, WISCONSIN

for more castings of higher

The need is critical for more, better quality, true-to-pattern castings.

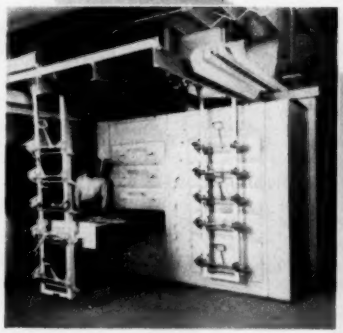
Coleman Core and Mold Ovens are vital in helping you meet this need better, faster and with less manpower.

Coleman Core Ovens produce perfectly baked cores, eliminate losses and delays caused by improper handling methods and inefficient oven equipment.

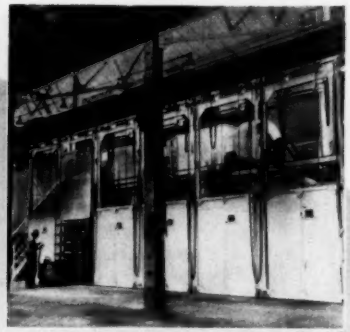
Coleman Mold Ovens for dry sand molding insure the proper drying needed to make castings always true-to-pattern. Coleman Ovens handle all types of molds uniformly and dependably, whether molds are to be skin dried or bone dried.

Today you are faced with acute labor shortages, high fuel costs, and scarcity of materials. That is why Coleman Ovens are more than ever essential to meet your requirements for increased production.

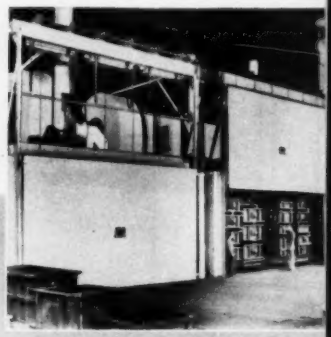
There is a type of Coleman Oven to help give you maximum production on every core baking or mold drying job. Write for Bulletin 48.



COLEMAN ROLLING DRAWER OVENS For small and medium cores. High-speed production with limited floor space.



COLEMAN TRANSRACK OVENS For use with portable racks to reduce handling labor. Very efficient where ample floor space is available.



COLEMAN CAR-TYPE OVENS For baking large cores or drying molds. Coleman Car-Type Ovens are used by most of the leading producers of heavy castings.

A COMPLETE RANGE OF TYPES: COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD — CLEVELAND 13, OHIO

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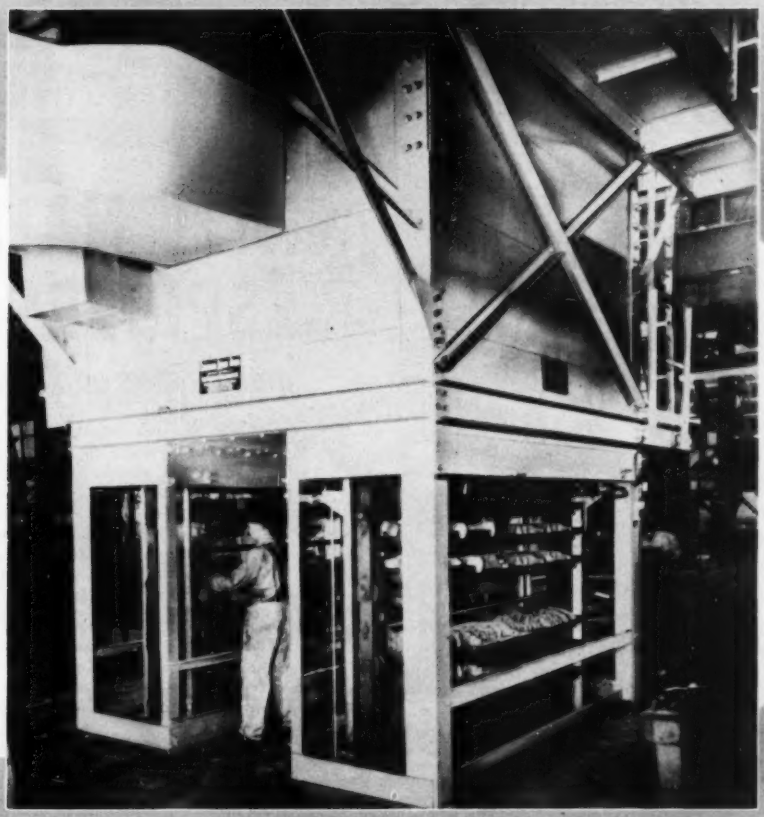
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

COLEMAN OVENS

quality, with less manpower . . .



COLEMAN TOWER OVENS For high speed production at lowest cost. Patented Open Center permits loading from inside and out, providing maximum labor saving.

ONLY COLEMAN OVENS OFFER ALL THESE ADVANTAGES

GREATEST SAVINGS IN MAN-POWER resulting from methods which reduce handling and indirect labor to a minimum.

INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.

PERFECT BAKING eliminates manpower and casting losses due to make-overs and rejects.

GREATEST SAVINGS IN FUEL by using the most economical fuel available.

MOST ECONOMICAL BINDERS for your particular casting requirements—oil or resin—can be used.

LOWEST MAINTENANCE COST for up-keep and service.

Control Foundry Chilling with...

CHILL KOOLHEAD NAILS

CHILL NAILS and SPIDERS in many types and sizes

Choose any style chill nail from jumbo to stubby; slim, medium, or horse nail blade; blunt, pointed, straight or 90° bent. Same types available in Stainless, Brass, Aluminum; Copper coated to order. Spider Chills, jumbo or horse nail legs—double or single. Available in various sizes and types; also made to your individual specifications. Whatever your chill job, rely on "KOOLHEAD."

Equally reliable—the "STANHO" precision quality line of Taper Pins, Woodruff Keys, Machine Keys, Cotter Pins, Straight Pins, Knurled Pins and all sorts of finished specialties and made-to-order parts.

Write for detailed descriptions and prices.

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KEYS

SPECIAL PARTS

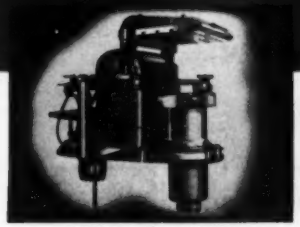
STANDARD HORSE NAIL CORP.

Since 1872

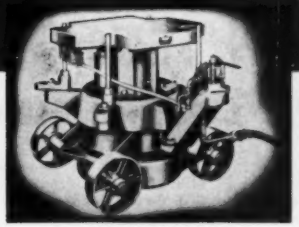
NEW BRIGHTON, PA.

F4

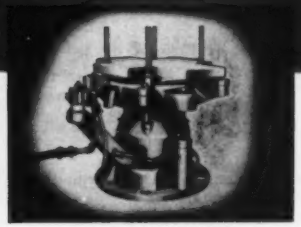
USE Davenport Better Castings



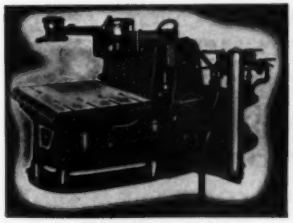
Jolt Rollover Draw, Model A
(6 sizes)



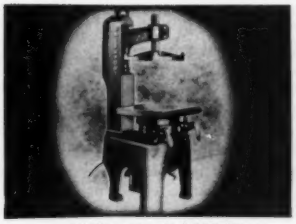
Jolt Pin Lift, Model AJS
Portable (5 sizes)



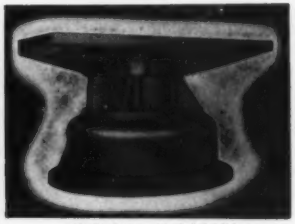
Jolt Pin Lift, Model AJS
Stationary (5 sizes)



Jolt Rollover Draw, Model SA
(6 sizes)



Jolt Squeeze, Model 10-JX
Portable and Stationary



Plain Jolter, Model AJ-RJ
(34 sizes)

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Research · Development · Control

3 REASONS WHY FOUNDRYMEN CHOOSE *Stevens* FACINGS

The Stevens Research, Development and Control program extends beyond the laboratory. It ranges from the sources of raw materials to testing of finished facings in actual foundry use. Graphites from the far corners of the world are carefully examined for carbon content, heat resistance and other qualities before they are even considered for foundry facings by Stevens. Binders are compared for strength, gas evolution and adaptability. All this is part of Stevens' program of *research* to *develop* better products for foundry work. Raw materials, after selection, are laboratory tested to make sure they meet the rigid Stevens standards and specifications . . . a step that assures *control* of ingredients. The finished product is again tested by laboratory technicians before delivery to guarantee controlled quality. Add up the benefits offered by the Stevens Research, Development and Control program and you'll agree that Stevens facings are the best buy. Let your nearby Stevens representative show you *all* the advantages you'll enjoy with Stevens products and services. Call him today—there's no obligation. Or write direct to F. B. Stevens, Inc., Detroit 16, Michigan.

- PLUMBAGO
- CORE PASTE
- LIQUID PARTING
- DRY PARTING
- CORE AND MOLD WASH
- MUDDING COMPOUND
- PITCH CORE COMPOUND
- SEA COAL

EVERYTHING FOR A FOUNDRY

FREDERIC B. **STEVENS** INCORPORATED

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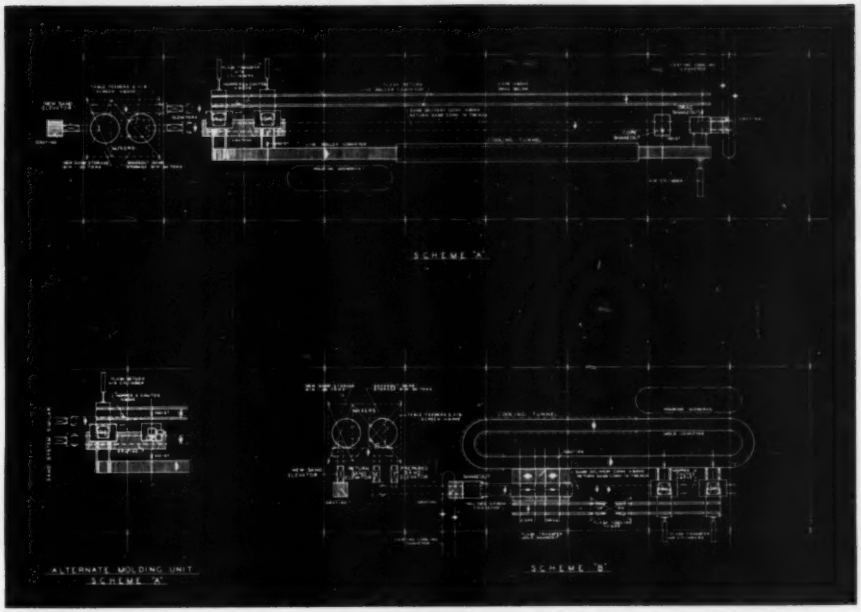


COMPARATIVE STUDIES

These studies, prepared for a Mid-western foundry, were made to investigate possibilities of low-cost, high-quality production for a specialized product.

The solution to a production problem can quickly be determined by combining the owner's understanding of his methods and practices with the technical ability and experience of Giffels & Vallet, Inc.

Our foundry engineers are available to assist *you*. We will gladly, without obligation, discuss your engineering problems and the assistance we can render.

GIFFELS & VALLET, INC.
INDUSTRIAL ENGINEERING DIVISION
1000 MARQUETTE BUILDING DETROIT

THER-MONIC

THER-MONIC
INDUCTION HEATING CORP NEW YORK

NEW DEVELOPMENTS IN ELECTRONIC HEATING!

ENTIRE ONE-MAN CORE ROOM OPERATION NOW POSSIBLE WITH NEW CORE BAKING TURNTABLE!

Ther-monic Model 300-T bakes 400 to 500 lbs. of sand cores per hour . . . depending on their moisture content. Core blowers, rollover machines and benches can be placed adjacent to the turntable. One man can load and unload the cores from the turntable, remove the baked cores from the driers or core plates and immediately re-use them. Baked cores require no cooling-off period. Space-consuming cooling and storage racks are eliminated.

NEW THER-MONIC CORE BAKING TUNNEL BAKES 133 LBS. OF SAND CORES PER MINUTE, FROM START TO FINISH!

The Ther-monic core baking process makes it possible to reduce handling and breakage. Cores up to 20" x 60" in any length are baked evenly throughout, with no green centers. The Ther-monic process achieves a finer core finish, eliminates over-baked and burned surfaces. No cooling period is required . . cores, after leaving tunnel, are immediately ready for inspection and use. Ther-monic baked cores are highly resistant to cracking during the pouring operation—reduce finning to a negligible factor. Write for complete details!

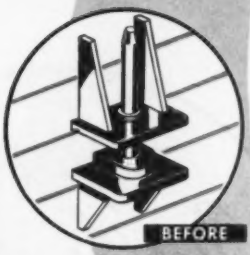
MODEL M7200

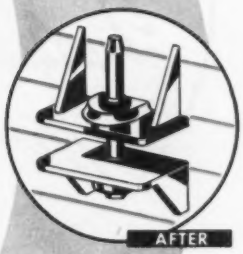
Capacity: Four Tons of Sand Cores Per Hour

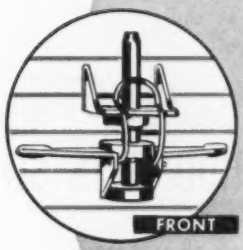
Overall dimensions of Conveyor and Electrode Housing: 8' x 8' x 32'

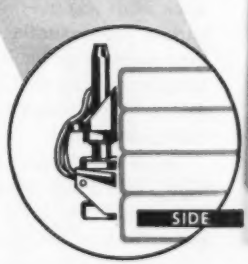
INDUCTION HEATING CORPORATION

181 WYTHE AVE., BROOKLYN 11, N.Y.









RESEARCH

that wears work gloves

Time and money-saving ideas don't always come from BS&B's ever-busy laboratories. The foundrywise workers who make BS&B Flasks developed these.

To provide more finger room and easier handling, note the new pinlug arrangement pictured at right above. Smooth, flat surface makes easier handling at the parting line of lightweight, one-man flasks.

Clamping spring (below) provides an automatic push-off arm for continuous line shakeout use. Both new features are optional . . . typical of BS&B's understanding of foundry problems, big and little.

See us at the National Foundry Convention in Buffalo, April 23-26.

BS&B *Fabricated Steel*
FOUNDRY FLASKS

BLACK, SIVALLS & BRYSON, INC.

Advertising Department Room 3-58-4FF
7502 East 12th St., Kansas City 3, Mo.

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Send full details about the new BS&B Pinlug and Clamp spring. ☐ Also send the famous BS&B "Foundry Flask Bible", the industry's most complete catalog, guidebook and data source. ☐ Have sales representative call.

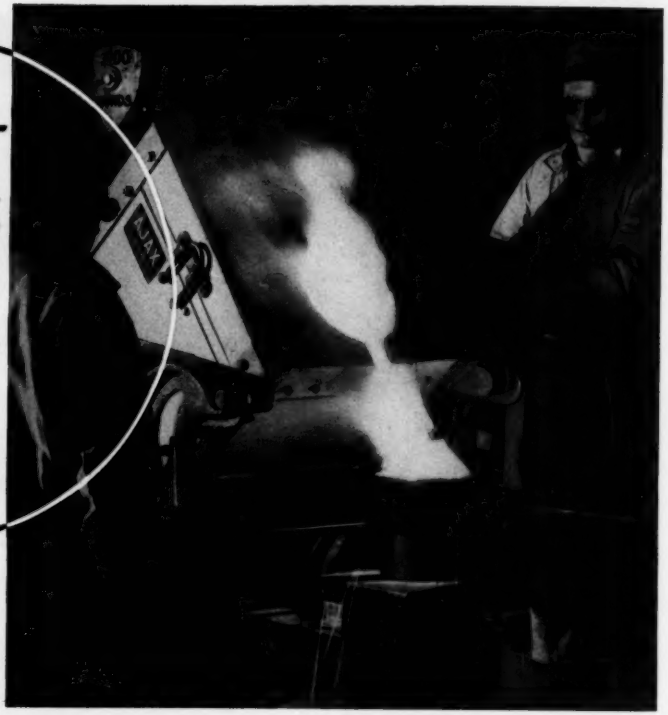
NAME_____ TITLE_____

FIRM_____

STREET_____

CITY_____ STATE_____

Ajax-Northrup Induction Melting



"NO OTHER METHOD GETS SO MUCH OUT OF THE MOLTEN METAL"

Users from all over the country praise the ability of Ajax-Northrup high frequency furnaces to give back what you put into them . . . no alloy loss, no carbon contamination . . . no off-analysis melts. Even the most difficult analyses, high in chromium, tungsten, nickel, and other "hard-to-handle" elements, are reproduced in melt after melt with unfailing precision!

Recovery of oxidizable alloys is phenomenally high . . . 98.5% chromium recovery reported by one user, 70 to 80% vanadium recovery by another. Savings in alloying elements and deoxidizers alone give Ajax-Northrup a two-to-one advantage in a nickel steel plant.

Ajax-Northrup furnaces are available in sizes from an ounce to a ton for non-ferrous and precious metals, to 8 tons for ferrous metals. Motor-generator units from 25 to 1200 kw. and up. Self tuning, trouble-free spark-gap converters from 3 to 40 kw. Just name your alloys and quantities—we'll send you the proper technical bulletins—free.

Says I. E. Waechter, Chief Metallurgist, Alloy Precision Castings Company.

AJAX NORTHRUP

HEATING & MELTING

Associate Companies

AJAX ELECTRO METALLURGICAL CORP.
AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
AJAX ENGINEERING CORPORATION

127

AJAX ELECTROTHERMIC CORPORATION • AJAX PARK • TRENTON 5, NEW JERSEY

"That's like making a casting without

PENOLYN CORE OIL!"

With *all 10* of these important features for maximum foundry efficiency — Uniformity • Concentrated form • No obnoxious odor • No seepage • No crusting of green mix • Clean working • Wide temperature baking range • Polymerized formulation • Minimum gas • Ample collapsibility

Penola Oil Company

NEW YORK DETROIT
CHICAGO ST. LOUIS

Our engineers are always ready to help you. Write us about your core oil problem.

Penola

BENJ. HARRIS & CO.

OVER 40 YEARS

PRODUCERS OF

QUALITY BRASS & BRONZE

Ingot

PROMPT AND DEPENDABLE SERVICE

ALL COMMERCIAL & GOVERNMENT SPECIFICATIONS SPECIAL ALLOYS

GENERAL OFFICES AND PLANT AT CHICAGO HEIGHTS, ILL.

cost conscious?
quality conscious?

...and what executive isn't?
Industrial Pattern Works have found answers to such problems as how to produce better cores with less core box expense—how to reduce scrap in both foundry and machine shop—how to increase precision to final dimensions, and many other worth-while objectives.

Let us explain the advantages of DUPLICAST core boxes in achieving these results. Samples on display at I.P.W. Headquarters, Hotel Lenox, Buffalo.

INDUSTRIAL PATTERN WORKS

2621 W. BELMONT AVE., CHICAGO 18, ILLINOIS

PATTERN AND CORE BOX ENGINEERING SERVICE

NOT JET-PROPELLED

but...the next thing to it!

...the fastest forward speed
...unmatched maneuverability

THE NEW **'butler 102'**

The new ***'butler 102'*** is designed, engineered and built to outperform any similar machine in the materials handling field! Always the world's quickest scoop-type boxcar unloader because of superior maneuverability and shorter turning radius, *now* its greatly increased forward speed — 11 miles per hour — gives the ***'butler'*** a notable advantage over the next best contender. And 11 miles per hour means a lot more trips per day.

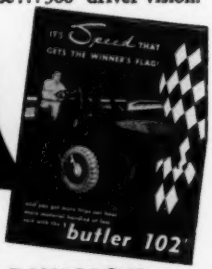
The new ***'butler 102'*** is built for rugged work in factory yards as well as in boxcars, on platforms and floors. Big pneumatic-tired wheels and balanced steering handle rough terrain — and there's plenty of power to charge up slopes.

The new ***'butler 102'*** dumping foundry sand into a sand-cutter. The new instant acting "Hydro-Dump" Scoop discharge saves many seconds that build up to hours per week.

Check these features — You'll find the ***'butler'*** wins on every point... 11 miles per hour forward speed... 6'3" turning radius... hydraulically controlled bucket of 1000 lbs. capacity... discharge height 60"... split-second forward to reverse... 360° driver vision.

The new ***'butler 102'*** has plenty of reach for loft storage. Crates, castings, baled, barrelled or boxed materials are readily transported. And of course anything granular in nature.

Get *all* the information about the new *'butler 102'*! The instant acting "Hydro-Dump"... the new simplicity of controls... all the features that make the new *'butler'* outstanding in handling just about every material. Send for Bulletin 250B.



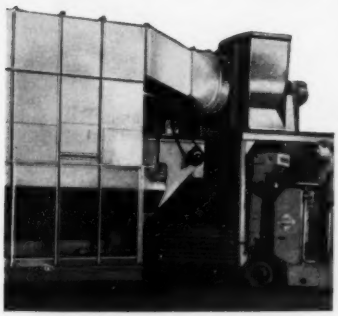
BUTLER BIN CO.

CARSCOOP DIVISION

932 BLACKSTONE AVE. • WAUKESHA, WISCONSIN

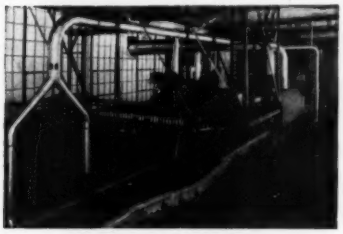
Solve Your Problems..with

Schmieg CENTRI MERGE



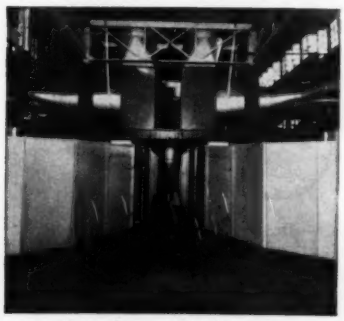
Swirl Type Arrester

This 30,000 CFM Centri-Merge Swirl type arrester unit is installed in a large Michigan grey iron foundry. Here it is used to remove dust and dirt from shake-out stations, sand handling and conditioning system. Note ease of collected dirt disposal which is by means of a skid on a lift truck. Conveyor drive may be seen on top of conveyor spout. Size of unit shows how readily it can be installed within building.



Exhaust System

A typical exhaust system for foundry cleaning room equipment, such as wire brushing machines, etc., illustrates the advantages of using Schmieg equipment to solve dust and fume problems.



Hoods and Exhaust

No loss of efficiency caused by dust and fumes with these Schmieg hoods and exhaust system for foundry mould conveyor.

what HAPPENS...

TO DUST, FUMES *and* SMOKE *in your plant?*

Are they collected completely as soon as they occur, cleaned from the air and quickly disposed of? Before they become a menace to health and a fire hazard, or a cause of lowered employee efficiency?

IF NOT—better consider right now the many advantages of a completely automatic Centri-Merge unit which collects dust, fumes and smoke quick as a flash, washes and scrubs them from the air by high pressure water action for convenient disposal as sludge.

Centri-Merge is the easy and economical air-cleaning system for any plant application. It gives non-fluctuating cleaning efficiency *all the time*, never requires a shutdown for cleaning or routine maintenance during working hours, and is engineered to occupy a minimum of valuable floor space and to save maintenance dollars.

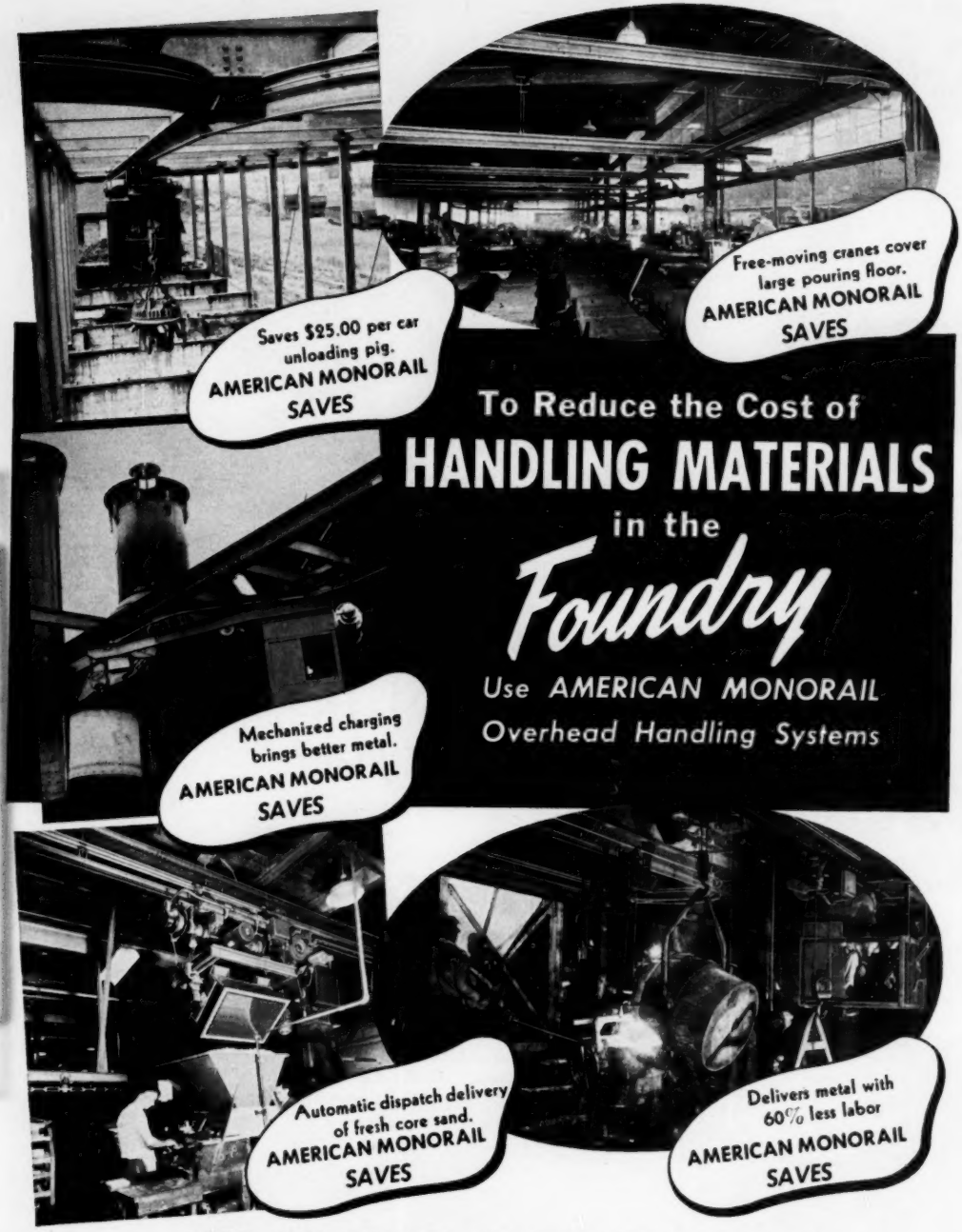
Better consult Schmieg engineers today for the best answers to dust, fumes and smoke control questions, or write for detailed information.

THE best AIR PURGE is CENTRI MERGE

Schmieg INDUSTRIES INC.

Engineers & Manufacturers

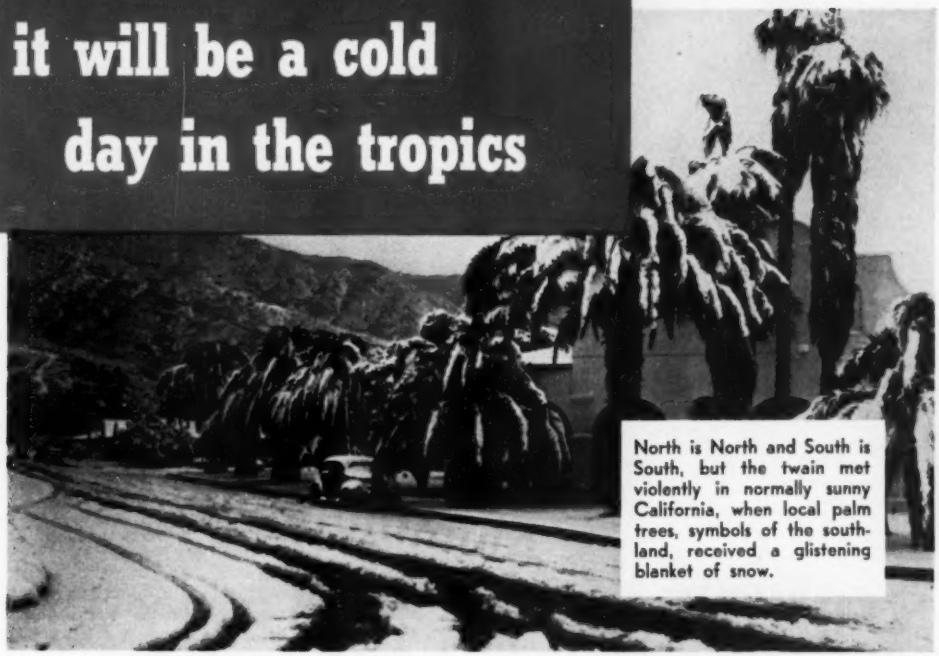
308 PIQUETTE AVENUE • DETROIT 2, MICHIGAN



THE AMERICAN MONORAIL COMPANY

13122 ATHENS AVENUE CLEVELAND 7, OHIO

it will be a cold day in the tropics



North is North and South is South, but the twain met violently in normally sunny California, when local palm trees, symbols of the southland, received a glistening blanket of snow.

—when we succeed in pleasing everybody all the time. But that doesn't keep us from trying. We believe in the old-fashioned principle of being friendly and helpful whether we are in a "buyers" or a "sellers" market.

FERRO-SILICON 25 - 50 - 65 - 75 - 85 - 90%
SPECIAL BLOCKING 50% FERRO-SILICON
LOW CARBON FERRO-CHROME SILICON
HIGH CARBON FERRO-CHROME
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BRIQUETS

SILICON • MANGANESE • CHROME
SILICO - MANGANESE

PHILO — RAINIER — © OFA 1939 © OFA 1941

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MEXICO—Casco S. de R. L., Apartado Postal 1030, Calle Atenas 32-13, Mexico, D. F., Mexico.

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NORTHWEST AREA—E. A. Wilcox Company, Arctic Building, Seattle 4, Washington; Phone Mutual 1468.

BIRMINGHAM DISTRICT — Schuler Equipment Company, First National Building, Birmingham, Alabama.

YOU and the Aluminum Situation

Once again foundries find it difficult to get exactly the aluminum alloys they want when they want them. The reasons for this are well known. Aluminum is a critical material and must go first where it is needed most.

Maybe you can help yourself in this situation . . . ask Federated for recommendations on alloys you can use successfully in place of your first choice. Often this means an even better casting, because new alloys and techniques are constantly being developed.

For example, Federated metallurgists were called to the Racine Tool and Machine Company, Racine, Wisconsin, where available aluminum alloys just wouldn't deliver the required combination of impact strength, yield strength and proportional limit in a Rail Tie-Tamper casting. Result: a new alloy was created and the casting met specifications.

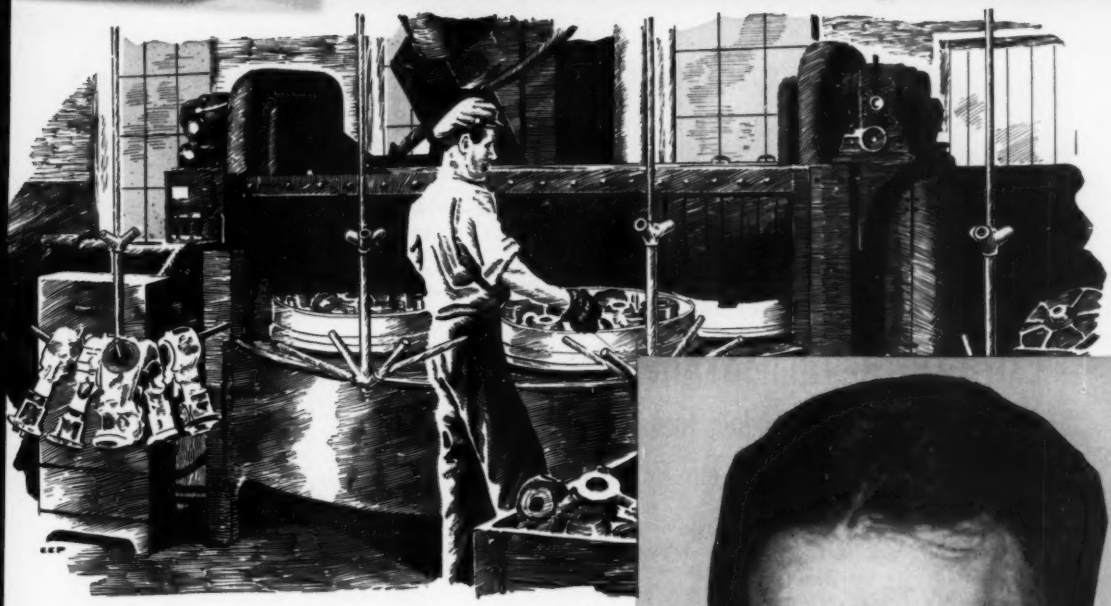
The same expert service and research . . . available to all foundries . . . are especially valuable now when problems are more numerous.

As far as supplies are concerned, all we can say is that Federated is mobilized, too. More and more metal flows out of Federated's 13 plants every day. Often it is not enough and often we are not free to distribute it at will. D.O.'s come first and no-one will dispute this necessity.

For technical and practical metallurgical help in solving aluminum alloy problems . . . and in conserving critical materials . . . write Federated, Department E.

Federated Metals Division

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.



ROTOBLAST*

Ends Cleaning Room DOWN-TIME

at Fairbanks, Morse

M. F. Putz, Foundry Superintendent of Fairbanks, Morse

PANGBORN ROTOBLAST pays off at the Freeport Works of Fairbanks, Morse with *no work stoppages* in the cleaning room. As M. F. Putz, Foundry Superintendent puts it: "ROTOBLAST gives us good service with nominal repair. We like it!"

And the record backs him up. Castings with hard-to-clean pockets are cleaned down to virgin metal . . . with tiny cracks and imperfections exposed, which saves time on inspection time and rejects. One man plus the ROTOBLAST Table and Barrel handles the entire cleaning load (25,000 pounds of *small* castings) per 8-hour day!

ROTOBLAST can save you money on blast cleaning. *Look to Pangborn for the latest developments in blast cleaning and dust control equipment.*

Here's the Key to Low-Cost, High-Quality Blast Cleaning

Pangborn ROTOBLAST saves from $5000 a year to $50,000 a year. Specifically, ROTOBLAST builds savings these five ways . . .

SAVES LABOR: One ROTOBLAST machine and operator can do as much as, or more than, a two-man crew and old-fashioned equipment.

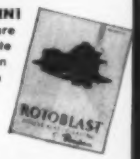
SAVES SPACE: In many cases, one ROTOBLAST machine replaces five or more old-fashioned machines.

SAVES TIME: Cases on record prove ROTOBLAST can cut cleaning time up to 95.8%.

SAVES POWER: Modern ROTOBLAST uses but 15-20 h.p. compared to 120 h.p. needed by old-fashioned equipment.

SAVES TOOLS: On work cleaned with ROTOBLAST, cutting tools last up to 2/3 longer because no scale is left to dull edges.

SEND FOR FREE BULLETIN! All ROTOBLAST machines are covered in Bulletin 214. Write for your free copy to: Pangborn Corporation, 1300 Pangborn Blvd., Hagerstown, Md.



More than 25,000 Pangborn Machines Serving Industry

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

*Trademark of the Pangborn Corporation

MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION FEMA

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Extra-Low-Carbon STAINLESS STEEL

New Type Chromium-Nickel Steels Have Added Corrosion Resistance

New and improved austenitic stainless steels of the 18-8 type have been developed which have superior corrosion resistance after being exposed to heat. These steels, known as extra-low-carbon stainless steels, were designed especially for use in welded and stress-relieved equipment that is exposed to more severe corrosive conditions than are normally encountered by other types of straight 18-8 stainless steel.

Under severe corrosive conditions, intergranular attack may occur in some of the higher carbon grades of austenitic-stainless steels that have been subjected to the temperature range of 800 to 1600 deg. F. during welding or hot forming operations. It is generally agreed that this type of corrosion is caused by complex carbides that are formed at the grain boundaries of the stainless steel during heating.

The effect of heat is rarely harmful in the ordinary fabrication of stainless steel for most applications, such as in architecture, the food and dairy industries, in hospitals, and in the home. However, in the chemical and other allied industries, where stainless steel is used in the handling of very corrosive chemicals, these new extra-low-carbon stainless steels should most certainly find wide use.

Fig. 1 Left: Carbide precipitation at the grain boundaries of an 18-8 stainless steel, containing 0.059 per cent carbon, after being held at 1200 deg. F. for 1 hour. Right: Absence of carbide precipitation in 18-8 stainless steel of 0.03 maximum carbon content, after being held at 1200 deg. F. for the same length of time.

In general, there are three ways in which the precipitation of carbides can be controlled in stainless steel:

1. Heat-treating so that the carbides present are dissolved.
2. Alloying with an element, such as columbium, tantalum, or titanium, that will tie up the carbon in the form of a harmless carbide.
3. Decreasing the carbon content of the steel.

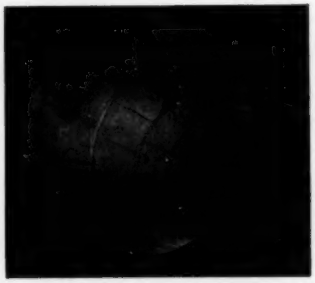


Fig. 2. The new extra-low-carbon stainless steels are especially suited for large types of process equipment, such as this fractionating tower. They require no heat-treatment after welding.

Heat-Treatment After Welding

Before the development of extra-low-carbon stainless steel, or of the "stabilized grades," one means for preventing intergranular corrosion was to heat-treat stainless steel that had been subjected to the dangerous temperature range, so that the precipitated chromium-carbides would go back into solid solution. It was found that when a welded part was heated to temperatures of 1950 to 2000 deg. F., and then cooled rapidly, most of the carbides were retained in solid solution. This extra heat-treatment is sometimes impractical, however, because of the design or massive size of some types of welded equipment.

Decreasing Carbon Content

A recent development in preventing intergranular corrosion has been the extra-low-carbon stainless steels. To be substantially harmless in stainless steel for as-welded or welded and stress relieved chemical equipment operating at temperatures under 700 deg. F., carbon must not be present in quantities over 0.03 per cent.

In 1937, ferrochrome with 0.03 per cent maximum carbon was first produced for the steel industry by ELECTROMET. This product has helped make it possible to produce very-low-carbon stainless steels—steels that are completely immune to intergranular corrosion after welding or after subjection to a stress-relieving heat-treatment.

The amount of stabilizing element that is necessary to "fix" carbon in stainless steel is in direct proportion to the carbon content of the steel. Therefore, the lower the carbon the less is the amount of stabilizing element required. Lowering the carbon content is an efficient means of conserving columbium, tantalum, and titanium.

Metallurgical Service Available

If you use welded stainless steel equipment, it will pay you to investigate the advantages of using extra-low-carbon steels. If you produce stainless steel, our metallurgists will be glad to give you technical assistance in the use of ferrochrome of 0.03 per cent maximum carbon. For further information, write to the nearest ELECTROMET office.

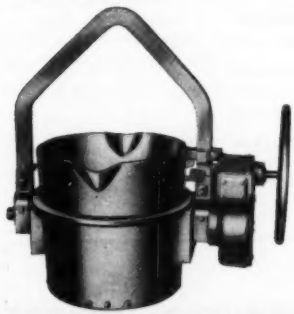
For a more detailed account of the properties of extra-low-carbon stainless steel, write for a free copy of the technical paper, "Resistance to Sensitization of Austenitic Chromium-Nickel Steels of 0.03% Max. Carbon Content".

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

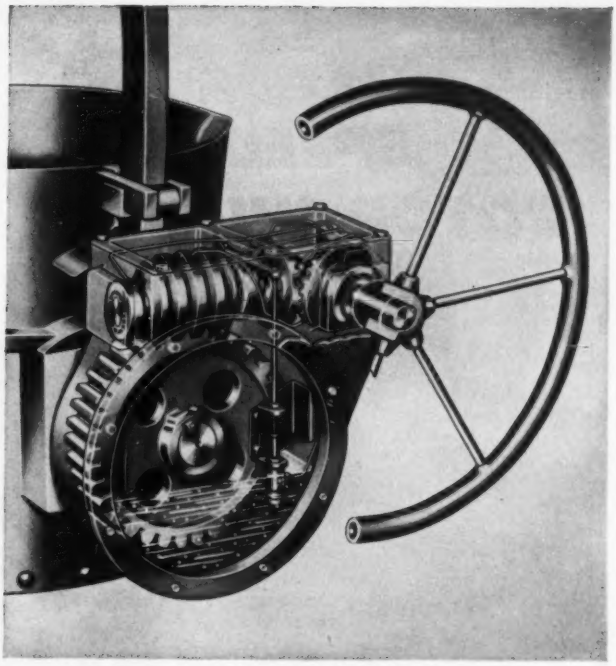
New Worm Ladle Gearing

ELIMINATES GASKET ADJUSTMENTS

- Completely enclosed and self contained
- Automatic force-feed lubrication
- Positively self locking in any position
- Precision cut gears



Model 592T ladle with new type gearing. Also notice use of Industrial Equipment's much talked-about UNIVERSAL BAIL. This bail completely eliminates binding due to heat distortion or misalignment. Rigid bail also available.



. . . WORM AND BEVEL GEAR ASSEMBLY COMPLETELY ADJUSTABLE

Here is another Industrial Equipment Company first . . . new, improved worm ladle gearing bringing *complete universal adjustability.*

Take a close look at the phantom view. Here is a one-piece, self-contained unit with all parts easily accessible. Your maintenance man can quickly make back-lash adjustments to pin-point accuracy and positive adjustment by adjusting the bearing lock nuts on all gears and worm. These nuts are easily reached and with working space to spare.

Unaffected by Heat

There is no connection between the bail and the gearing. No clearance for heat distortion is necessary, permitting an assembly almost to machine tool precision.

Industrial's new gearing is absolutely safe and positively self locking. The high ratio between worm and worm gear locks the ladle in any position. Incidentally, worm and bevel gears are of high tensile semi-steel and the worm is of high alloy steel. All are precision cut. Shafts are mounted on anti-friction bearings.

Now Standard Equipment

All Industrial geared ladles are now supplied with this outstanding new type of gearing. In addition, this gearing can be supplied for any Industrial worm geared ladles now in operation. *Write for details.*

Do you have our revised catalog No. 35?

Industrial

EQUIPMENT COMPANY

115 N. Ohio St., Minster, Ohio

LADLES • BOWLS • SHANKS • BAILS • TONGS • SPECIAL EQUIPMENT

SPEEDY ROTOR CHIPPERS "PAID OFF" in 29 days

JOB: Cleaning off excess metal from base plate castings for printing presses. Men on incentive. Rigid inspection. Were using 14¾-lb. hammers—slow and hard to control.

SOLUTION: Rotor Application Engineer recommended new Rotor Chipper. Weighs only 11½ lbs. Easy to maneuver. High speed. Lots of wallop.

RESULTS: Cut rejects. More output per day "paid off" new Rotor Chipper in 29 days.

Unusual? Not at all! We believe we can get similar results in your plant. Call us for a survey.

ROTOR CHIPPER FACTS

LIGHTER . . . 1½ to 3 lbs. less than other chippers.

SHORTER . . . 1" to 2" shorter . . . easier to get into crowded corners.

MATCH YOUR JOB . . . Each basic model can be adapted to three kinds of work.

AIR O'TOOL

Moline Malleable now makes larger and more complex cores with THERMEX *Core-baking Equipment than were possible with their former equipment. This progressive company reports that* THERMEX *Core-baking Equipment "brings about the most important improvement in core-baking operations in years."*

"pays for itself in less than a year"

—MOLINE MALLEABLE IRON CO.

Thermex
ELECTRONIC CORE-BAKING EQUIPMENT

A partial list of companies who have purchased THERMEX Electronic Core-baking Equipment

American Hardware Corp.
Brugger Manufacturing Co.
Crane Company
Ford Motor Co.
Grand Haven Brass Foundry
Grinnell Company, Inc.
Moline Malleable Iron Co.
National Malleable & Steel Castings Co.
Ontario Malleable Iron Co.
Phoenix Brass Fittings Corp.
Ronci Company
Sterling Faucet Company
United Foundries, Inc.
United States Pipe & Foundry Co.

"WE ESTIMATE," states Moline Malleable Iron Co. of St. Charles, Ill., "that our new THERMEX Core-baking Equipment will pay for itself in less than a year. We have just placed an order for a second THERMEX installation." Here's why:

- **Labor costs have been cut drastically, in the baking department, and in the core-making department as well.**
- **Utility costs per ton of sand have been cut more than 50%.**
- **Only one-fourth the floor space of conventional baking equipment is needed —freeing this space for other work.**
- **Core rejects have been reduced 66%.**

Why not take advantage of the labor-saving, cost-cutting advantages of THERMEX Core-baking Equipment? Girdler manufactures dielectric core-baking equipment in capacities from ½ ton to 15 tons per hour. For complete data write The Girdler Corporation, Thermex Division, Louisville, Kentucky.

THERMEX—T. M. Reg. U. S. Pat. Off.

THE GIRDLER CORPORATION
Thermex Division

THIS KIRK AND BLUM DUST CONTROL SYSTEM ON SPRUE-BREAKING AND CORE KNOCK-OUT OPERATIONS

● In foundry operations . . . wherever you'd expect to find dust, smoke and fumes and *don't* . . . there you'll likely find a KIRK & BLUM installation.

In the photo shown above, for example, a dust control system fabricated and installed by Liberty Engineering, Division of KIRK & BLUM virtually eliminates dust. Of particular interest is the "flat-back" elbow. The curved plate shown is easily replaced or may be lined with abrasion-resistant material to meet severe conditions.

The photograph below shows the molding line, hoppers and supports which were also fabricated and installed by the Liberty Engineering Division. Other KIRK & BLUM systems are found in this same well known manufacturer's plant.

Whatever your foundry dust, fume or smoke problem . . . sand handling, pouring station ventilation . . . mold cooling, shakeouts, grinding and snagging or others . . . KIRK & BLUM Engineers have the experience needed to offer the logical solution, for truly efficient dust control.

Fabricated and Installed by Liberty Engineering Div. The Kirk & Blum Mfg. Co., Indianapolis, Ind.

For detailed information and literature write
The Kirk & Blum Mfg. Co.
3176 Forrer Avenue Cincinnati 9, Ohio

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST CONTROL SYSTEMS

SERVING.....the Non-Ferrous Field for over 60 Years

A Performance Record That Guarantees

DEPENDABILITY

UNIFORMITY

QUALITY

- BRASS & BRONZE INGOTS
- MANGANESE BRONZE
- ALUMINUM BRONZE
- NICKEL SILVER

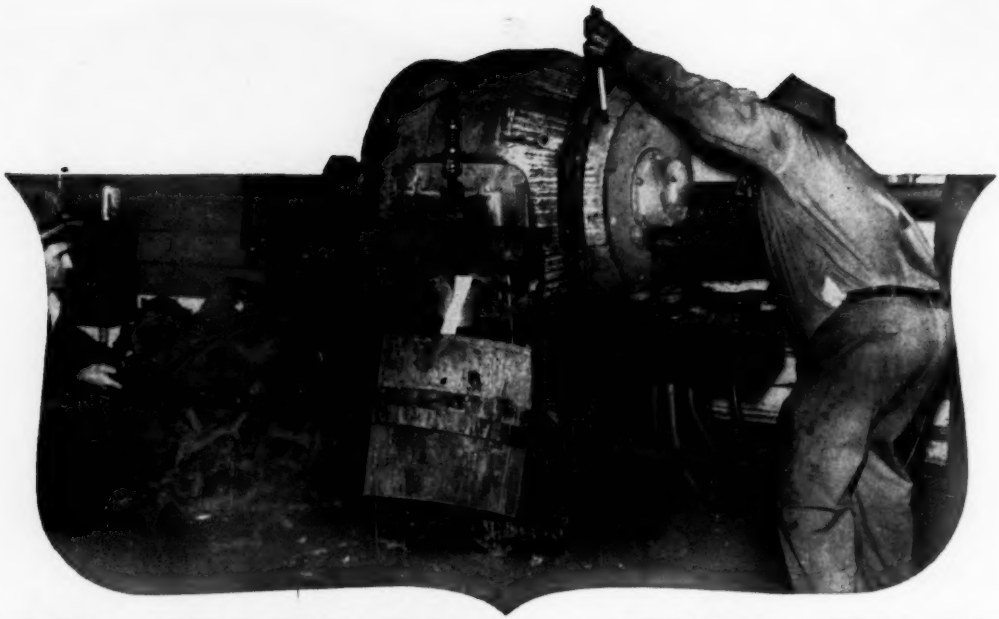
Foundrymen look for the Kramer trade-mark on brass and bronze ingots . . they know the value of Kramer's years of research and achievement

H. KRAMER & CO.

SMELTERS & REFINERS OF METALS

General Office and Plant • 1315-1359 W. 21st Street • Telephone CAnal 6-6600

CHICAGO 8



THE HEAT'S ON for MORE HEATS

FROM YOUR DETROIT ELECTRIC FURNACES

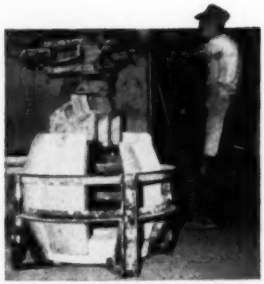
Here's the "*inside story*" on how to get them!

Now, with defense requirements demanding more and more metal production, you can't afford to be delayed by frequent furnace shut-downs. Detroit Electric Furnaces, lined with Taylor Sillimanite (TASIL) brick and shapes, are setting new records for long, efficient operation and lower refractory costs per ton of metal melted. Specify TASIL linings and keep that metal pouring!

FOR EXAMPLE:

At a foundry in Indiana, a 350 lb. "LFC," lined and maintained with TASIL brick and TASIL cements, is still going strong after producing more than 9000 heats of 85-5-5-5 brass over a 28½ month period! That's ample evidence why an increasing number of foundries have standardized on TASIL linings.

TASIL bricks and shapes possess many desirable properties that increase furnace lining life. They have high hot load strength; high softening point (3335° F.); high volume stability throughout the temperature range; excellent resistance to spalling and slagging. Lining life may be further prolonged by maintaining with one of several types of TASIL Patches and Cements especially "engineered" for this job. Contact the Taylor representative in your area or write direct for complete information on TASIL linings for Detroit Electric Furnaces. There is no obligation.



TASIL Detroit Electric lining being pre-assembled at the Chas. Taylor plant. All linings are fitted to gauge (supplied by the Detroit Electric Furnace division, Kuhlman Electric Company) and are match marked for assembly, before shipment.

Refractorers to industry since 1864.

Exclusive Agents in Canada:
REFRACTORIES ENGINEERING AND SUPPLIES, LTD.
Hamilton and Montreal

The CHAS. TAYLOR SONS Co.

MANUFACTURERS OF REFRACTORIES • CINCINNATI • OHIO • U.S.A.

A FEW OF THE MANY ROYERS AVAILABLE FOR proper sand conditioning

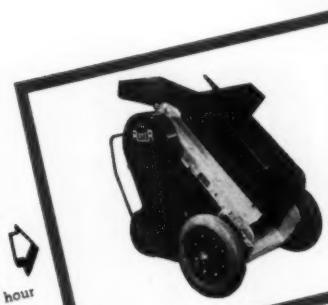
Model NC-2
12 to 15 tons per hour

The Royer Junior
4 to 7 tons per hour

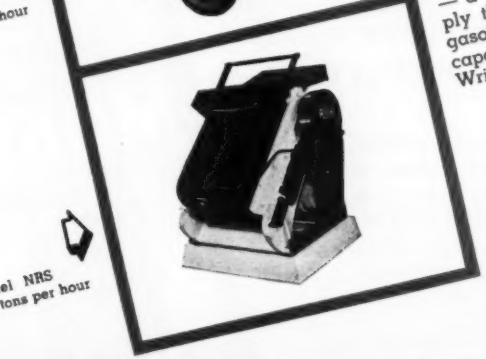
Royer Sand Separators and Blenders are available in many models and capacities for the proper preparation of your molding sand. Only with the Royer do you get six point sand conditioning — (1) thorough refuse removal, (2) positive lump breaking, (3) complete blending and mixing, (4) even distribution of moisture, (5) increased permeability, (6) double aeration. More than 8,000 Royers are in use today in large and small foundries — jobbing or production—supplying properly conditioned sand for true-to-pattern molding.

The Royer eliminates all hand labor except shovelling into the hopper — sand conditioning costs are cut as much as 50% over manual methods and new sand requirements are greatly reduced.

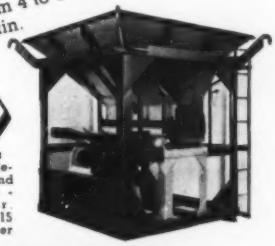
Whatever your capacity requirements may be — a Royer or combination of Royers can supply the demand. Available in electric motor, gasoline engine or belt-to-tractor drives and in capacities of from 4 to 50 tons of sand per hour. Write for bulletin.



Model NDP
20 to 25 tons per hour



Model NRS
40 to 50 tons per hour

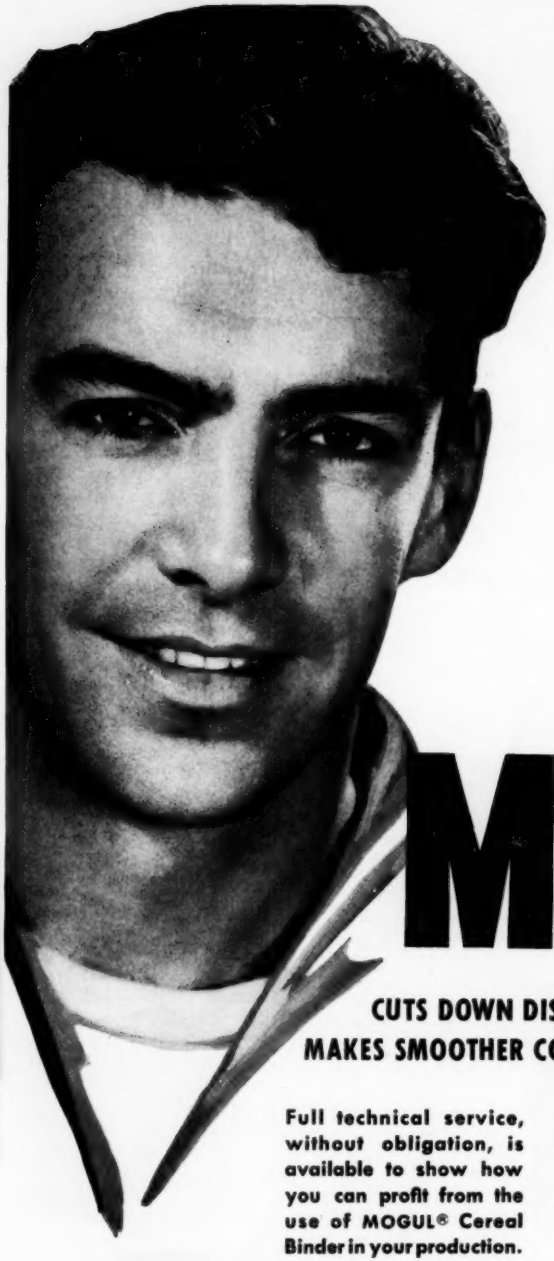


Combination Scrap Remover and Sand Separator-Blender. Model NDC—15 to 25 tons per hour.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.
155 PRINGLE ST., KINGSTON, PA.



You can cut down drying time with MOGUL

CUTS DOWN DISCARDS
MAKES SMOOTHER CORES

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

the preferred dry bond for cores

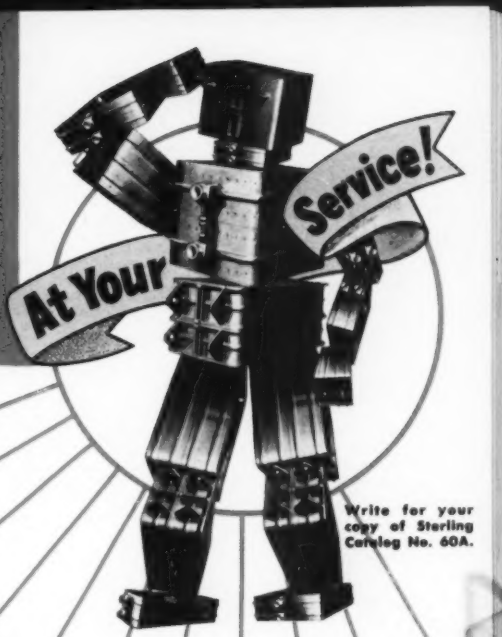
Write Technical Sales Department

CORN PRODUCTS REFINING COMPANY
17 Battery Place, New York 4, N. Y.

Sterling

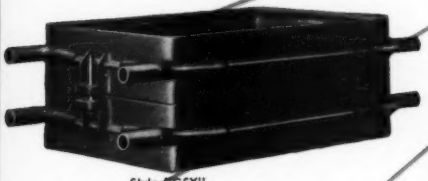
ROLLED STEEL CHANNEL FOUNDRY FLASKS

Produce Better Castings!

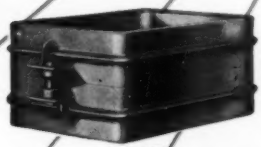


North American foundries . . . more than 4,500 of them . . . have adopted Sterling Steel Flasks for greater efficiency, longer life and more profitable foundry operation. These same foundries continue to specify Sterlings whenever more flasks are needed. That's because Sterlings have the strength and rigidity to resist distortion and to take hard, everyday punishment. Fabricated from special rolled steel channel into one solid, rigid piece, Sterling Flasks are capable of withstanding tremendous pressures. They retain their rigidity and accuracy over a long period of years. Available in a variety of styles and shapes.

Write for your copy of Sterling Catalog No. 60A.



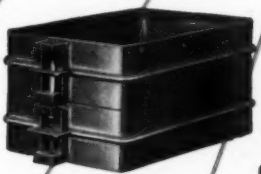
Style "GSX"
with Single Pin Lugs and Two-Man Lift Handles



Style "E"
with Pin Lugs and Handles Combined

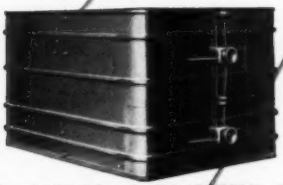
Style "½ND-RTX Cope" — Style "½NS-RT Drag"
with Heavy Duty Clamps (Patent No. 1974292)

Style "AD"
Flask Sections Stacked One Above Another
for Multiple Molding

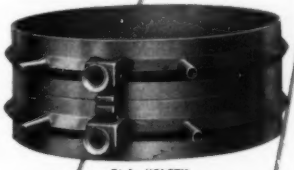


Style "AD"
with Double Pin Lugs

Style "LS"
with Angle Reinforcement
and Two-Man Lift Handles



Style "½ND-RT Cope" — Style "½NS-RT Drag"
Heavy Duty Flask (Patent No. 1974292)



Style "BLST"
with Trunnions and Two-Man Lift Handles

Style "H"
with Pin Lugs Welded on Sides

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.

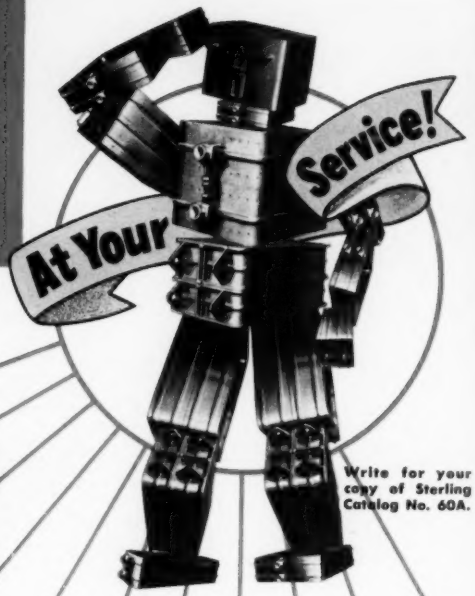
Branch Offices: Boston · Buffalo · Chattanooga · Chicago · Cleveland · Detroit · New York · Philadelphia · St. Louis

Sterling

FOUNDRY EQUIPMENT

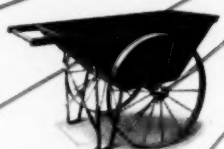
for Heavy-Duty Foundry Work

In addition to Steel Flasks, Sterling offers a complete line of Flask accessories and a variety of foundry equipment. Custom-built for heavy duty foundry service and high-speed production schedules, every piece of equipment is backed by the well-known Sterling reputation for correct design and excellent workmanship. The Company has always maintained a policy of fabricating to high quality standards. Consult Sterling the next time you require foundry equipment. The Sterling branch office near you will gladly give you information and estimates — or write to factory.



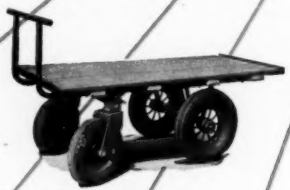
Write for your copy of Sterling Catalog No. 60A.

No. 116-A Heavy Duty Wheelbarrow



No. 47 Casting Cart

No. 50 Slag Buggy



No. 110-A Core Truck

Sterling Flask Clamp

No. S-5W Wheelbarrow for sand and other dry materials

No. 160 Heavy Duty Casting Truck

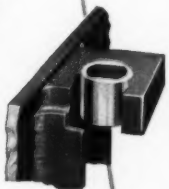
Standard Type "S" Flask Pin

Heavy Duty Cart with "3-Point Landing"

Style X Core Plate

Stub Pin Shiftproof

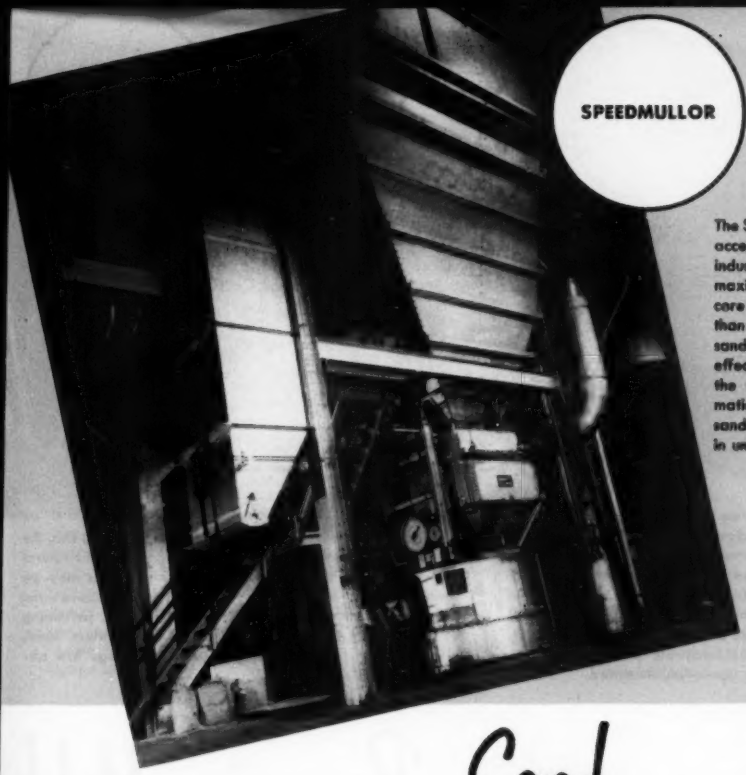
No. 630-S Cart with Steel Wheels



Standard Hardened Steel Bushing

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.

Branch Offices: Boston · Buffalo · Chattanooga · Chicago · Cleveland · Detroit · New York · Philadelphia · St. Louis



SPEEDMULLOR

The Speedmullor is today acknowledged as the accepted foundry sand mullor throughout the industry. Speedmullor mulling develops the maximum physical properties of molding or core sands in minimum time cycles . . . less than 90 seconds for most synthetic or natural sand mixtures. Speedmullor cooling is the only effective method of cooling hot sand during the mulling cycle. New Multitrolmatic® automatic cycle controls take the variables out of sand preparation, and thus provide the ultimate in uniformity and control.

BETTER METHODS OF *Sand Mulling*

BY BEARDSLEY & PIPER

DIVISION OF PETTIBONE MULLIKEN CORPORATION
2424 N. Cicero Ave., Chicago 39, Illinois

WRITE FOR BULLETIN ON ANY OF THESE PRODUCTS!

LABORATORY MULBARO

Provides highly effective mulling of small special batches, or test batches of molding or core sand. This machine permits close laboratory control of sand preparation. Two or more mixing bowls may be used with one machine, providing a high degree of laboratory efficiency. With removable mulling bowl and pivot-mounted mulling mechanism, the Laboratory Mulbaro is extremely easy to clean.

MULBARO

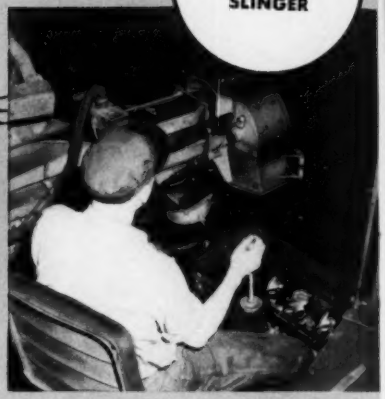
A portable sand mullor designed for those foundries that require small batches of completely mulled sand for coremakers or molders located throughout the foundry. Because the sand is delivered to the molder or coremaker in the same barrows in which it is mulled, less sand handling is necessary, and several barrows may be used with one Mulbaro mulling mechanism.

BETTER METHODS OF Ramming Molds

AUTOMATIC SPEEDSLINGER

Brings the speed and truer-to-pattern ramming of the Speedslinger to those installations requiring the very highest molding rates from production pattern equipment. An electrically driven cam actuates the hydraulic mechanism which controls the movement of the ramming arms. Repetitive molds are rammed uniformly, accurately and automatically. Eight B&P Champion Speed-Draw Machines mounted on a B&P Turntable provide fast, accurate pattern-draw and facilitate the Speedslinger operation illustrated.

REMOTE CONTROL HYDRA-SLINGER



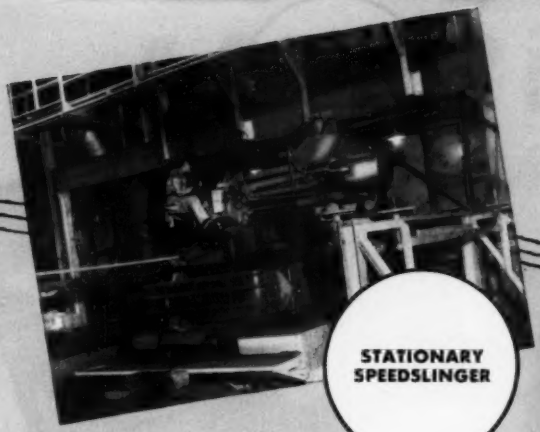
All the proven advantages of Sandslinger ramming plus the added speed and convenience of remote hydraulic-control are combined in the Hydra-Slinger. The controls may be positioned at any location adjacent to—or above—the ramming area. Operator fatigue is eliminated, permitting top efficiency throughout the shift. Truer-to-pattern molds and higher quality—truer-to-dimension castings are obtained consistently.

STATIONARY SANDSLINGER

Used primarily for production work in foundry bays with sand conditioning systems. Its large ramming area permits the ramming of a wide range of molds and cores. The Sandslinger illustrated is ramming core boxes mounted on roller conveyor sections. The Sandslinger may also be used in conjunction with rollover-draw machines, transfer cars, power conveyors or molding turntables.

SWINGSLINGER

The Swingslinger's ramming head is mounted directly on the ramming motor to form one compact mechanism. This mechanism is suspended from a rugged steel frame and provided with sand by a plate feeder or sand supply belt. Provides a compact, high-production molding unit for the ramming of small or medium size patterns. Swingslinger ramming is most effective when applied to flasks or core boxes whose ramming requires no greater angular movement of the head than 6½ degrees from the vertical.



STATIONARY SPEEDSLINGER

Extends the advantages of Sandslinger ramming to those installations requiring greater capacity and range of operation than are available with the Sandslinger. The Speedslinger increases the capacity of the foundry in which it is installed and extends the size range of castings that may be profitably produced. A rugged hydraulic-control mechanism provides a high degree of ease and accuracy of operation. This machine's ramming speed facilitates the highest production per man-hour, and the highest production per square foot of floor space utilized.

TRACTOR SANDSLINGER

Designed for the production of small and medium size molds in foundry bays not served by auxiliary sand handling or conditioning systems. It loads and prepares its own sand, and is ideally suited for conditions where production is desired from a variety of patterns that may be mounted on pattern-draw machines and pulled along behind it. Shown above are two of four Tractor Sandslingers used in a large Midwest gray iron foundry.

...and Cores BY BEARDSLEY & PIPER

DIVISION OF PETTIBONE MULLIKEN CORPORATION
2424 N. Cicero Ave., Chicago 39, Illinois

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B&P

MOTIVE SANDSLINGER

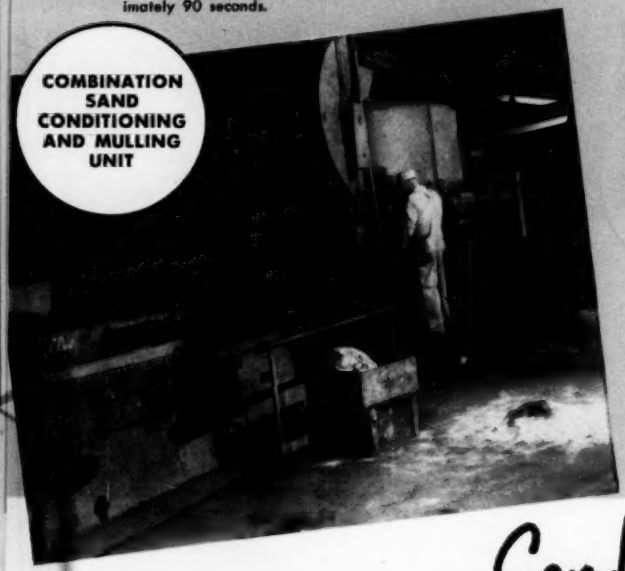
The flexibility of the Sandslinger method of ramming is fully realized in a jobbing foundry when a Motive Sandslinger is used. Operates on tracks in the foundry and is able to ram a very wide range of pit and flask work. Designed for those foundries where the size of pattern and flask equipment makes it more practical to move the slinger to the flask, rather than the flask to the slinger.

MOTIVE SPEEDSLINGER

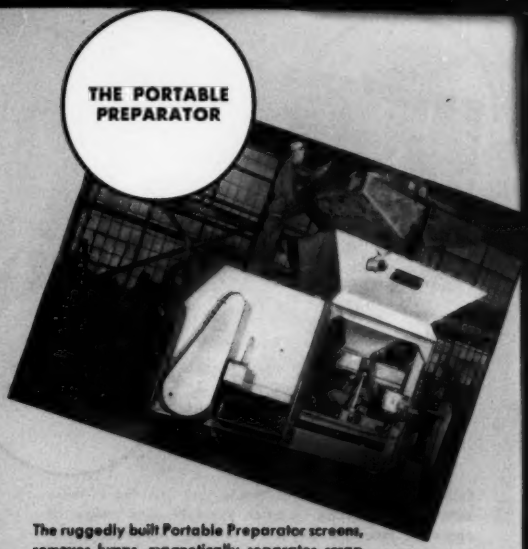
This machine has the largest ramming capacity and the greatest range of operation of any slinger. Handles the largest molds on a production basis, and yet provides the complete flexibility essential to successful jobbing foundry operation. Extends the foundry's range of operation and cuts ramming operations to a fraction of the time formerly required.

Designed for those foundries that desire the advantages of fully mulled and conditioned molding sand without the outlay necessary for a complete sand system. Provides complete screening and magnetic separation and offers unequalled thoroughness of mulling. This combination unit provides the foundry with fluffier, more uniform molding sand that increases productivity and improves mold quality. The unit illustrated receives, completely conditions, fully mulls and discharges a one-ton batch of molding sand in approximately 90 seconds.

COMBINATION SAND CONDITIONING AND MULLING UNIT



THE PORTABLE PREPARATOR



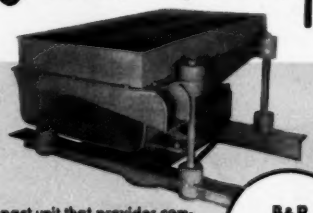
The ruggedly built Portable Preparator screens, removes lumps, magnetically separates scrap iron and shot, double aerates and adds moisture to the sand. Built to take the roughest treatment—all operating parts are protected by dust-tight enclosures. Lifting trunnions facilitate easy crane movement of the machine about the foundry.

BETTER METHODS OF Sand Conditioning BY BEARDSLEY & PIPER

DIVISION OF PETTIBONE MULLIKEN CORPORATION
2424 N. Cicero Ave., Chicago 39, Illinois

NITE-GANG

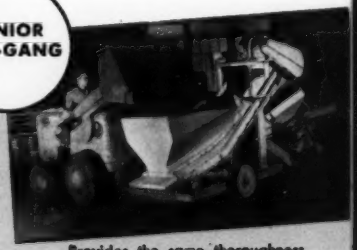
The newly developed Nite-Gang has proved itself under the toughest conditions. This self-propelled machine loads the sand to be prepared, completely blends it, magnetically removes scrap iron and shot, double aerates the sand, and discharges it into pile, windrow or bin.



B&P GYRATORY SCREEN

A compact unit that provides complete and thorough sand screening. Occupies very little space and yet provides an important element of dependability for any sand system. Its rugged construction insures long, trouble-free operation.

JUNIOR NITE-GANG



Provides the same thoroughness of conditioning as does the Nite-Gang, but is designed for use in conjunction with front-end loaders or other loading devices. Sand loaded into its bin is magnetically separated, screened and doubly aerated before discharge. The result is a completely uniform, fluffier, more easily workable molding sand.

WRITE FOR BULLETIN ON ANY OF THESE PRODUCTS!

SCREENARATOR

This lowest cost sand preparation unit is built in three models that provide capacities of 750, 1000 and 1500 pounds per minute of screened, double aerated and thoroughly blended molding sand.

A BETTER CORE OIL
Can Give Your Production Just the Boost it Needs!

...with higher quality castings and lower costs

Get the Facts on the Latest Developments in PELRON "Performance Proved" Core Oils

Learn how these products, perfected by extensive research and proven on the job in leading foundries, will give you these great advantages:

- Lower cost and higher quality—lower baking temperature and shorter baking time—increased production!
- High green strength—higher baked strength.
- Excellent collapsibility for easy shake-out.
- Smoother cores for better castings.
- Excellent performance in either blown or hand-rammed core boxes.

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Foundry CORE Practice

A Revision of "MODERN CORE PRACTICE AND THEORIES"

. . . dealing exclusively with the production and use of cores in the modern foundry

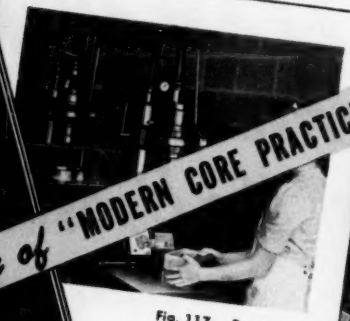

Fig. 117—Bench-type Core Blowing Machine

Fig. 190—High-frequency Dielectric Core Baking Oven

Written in practical, understandable language for operating men and metallurgists, FOUNDRY CORE PRACTICE covers the entire cycle of core-making operations . . . from materials and mining methods to final setting of cores and molds.

A complete 560-page handbook, containing 314 photographs, graphs, and sketches, 81 tables and an extensive bibliography, the text covers:

- INTRODUCTION
- CORE SANDS — TYPES AND LOCATIONS
- CORE BINDING MATERIALS
- CORE MIXTURES
- STORAGE AND CONDITIONING OF CORE MATERIALS
- MIXING EQUIPMENT, OPERATIONS, DISTRIBUTION AND STORAGE
- CORE MAKING METHODS AND EQUIPMENT
- FACTORS AFFECTING CORE BAKING
- CORE OVENS AND THEIR CONTROL
- CORE FINISHING OPERATIONS
- CORE COATINGS
- CORE HANDLING
- PROCEDURES FOR DETERMINING THE PROPERTIES OF CORES AND CORE MIXTURES
- CONTROLLING CORE PROPERTIES
- CORE SETTING
- CORE KNOCK-OUT
- CORE SAND RECLAMATION
- CASTING SURFACES AS AFFECTED BY CORE-SAND MIXTURES
- ECONOMICS OF CORE PRODUCTION
- DEFECTS CAUSED BY FAULTY CORES

Over 100 leading authorities on foundry problems collaborated with the author, Harry W. Dietert, an international authority on sand problems, to pool their knowledge to make FOUNDRY CORE PRACTICE the type of book that will be of maximum benefit to the foundry field . . . available now to AFS members for $6.50; list price $10.00.

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American Foundrymen's Society

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Please send me promptly ..... copies of "Foundry Core Practice" by **H. W. DIETERT.**

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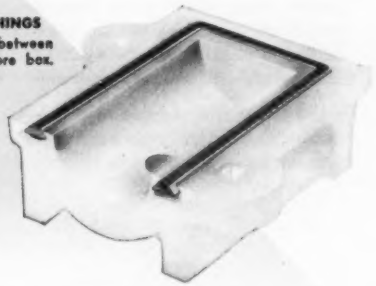
when you need CORE BOX PROTECTION ...it's MARTIN

"PROTEXABOX PINS"
Cannot mar the box face because they will not loosen. Protective rubber tip guaranteed to stay on.

"SAND ARRESTER TUBE"
Save cores and step up production. Guaranteed for 100,000 blows.

Every Martin product is designed especially for "core box protection"—each is built to prevent a specific type of wear on your core boxes. They are engineered by foundry men to assure easy installation, successful operation. Martin products add years to the life of your equipment by enabling you to salvage old plates and core boxes, by preventing abrasion, and giving your plywood blow plates the lasting qualities of steel. Each product carries a guarantee of absolute satisfaction. Martin products are distributed all over the world by foundry supply houses.

"HOLINER" BUSHINGS
Stop abrasion between blow plate and core box. Protect blow holes.



"STRIPINSERT"
Protects parting line—easily installed in old or new boxes. Cutters for groove available at moderate cost.

"PULLINSERT" BLOW BUTTONS
Positively stop sand blasting under blow holes. Available in nine popular sizes.

"VIBROLATOR"

The powerful all-directional vibration of the Peterson Vibrolator makes this an ideal unit for keeping materials flowing in chutes or hoppers. The Vibrolator will not crack attaching lugs on match plates or core boxes. Instantly self starting and virtually noiseless in operation, this new type vibrator eliminates maintenance worries and gives a long, dependable service life. No lubrication is necessary. The Vibrolator is light in weight to lessen fatigue and permit maximum delivery of vibration. There are five sizes available to meet all your foundry requirements. Peterson Vibrolators are sold only by Martin, exclusive manufacturers of ball-type vibrators.

"VIBROLATOR"

WRITE for folders describing these Martin products in detail. If you have a sand movement problem, send us complete information and our engineers will prescribe the correct vibrator for your needs.

MARTIN ENGINEERING COMPANY
KEWANEE, ILLINOIS

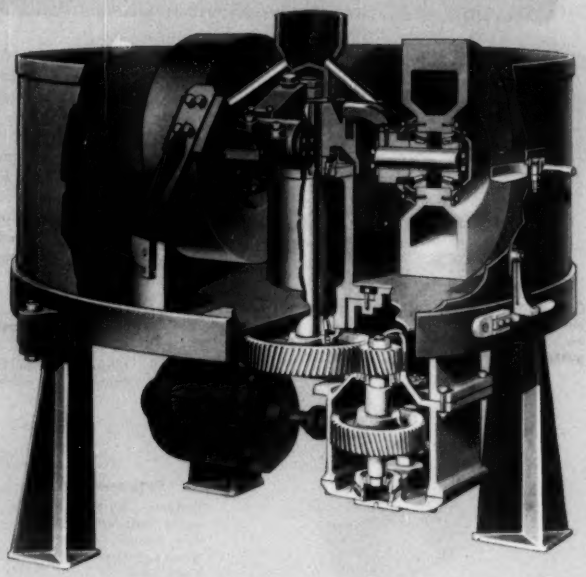
here's proof of Dependability and Long Life . . .

2 SIMPSON MIXERS NOW IN THEIR 22nd YEAR OF CONTINUOUS SERVICE FOR LARGE MIDWEST STEEL FOUNDRY

Since 1929, a well-known midwest steel foundry has relied upon two No. 3 Simpson Mixers for the tough job of properly preparing steel facing sand used in producing high quality steel castings weighing from 1 to 3200 lbs.

Realizing that modernization is the key to greater production, this progressive foundry recently modernized their two Simpsons, with the result that even greater mixing efficiency has been accomplished . . . working 10 hours a day, six days a week . . . producing 500 to 550 tons of finished castings per month.

This is just one example of the dependable, long life performance that Simpson Mixers are giving to the Foundry Industry.



Why Simpson Mixers Last Longer—Do A Better Job . . .

The superior design and construction features of Simpson Mixers are responsible for their long life. These, together with the *true* mulling principle employed, are the most important features in reducing horsepower requirements, operating costs, and maintenance. This mulling principle, which provides the most efficient and economical method of preparing foundry sand, develops the properties of flowability, toughness, elasticity and uniformity of sand not obtained by any other method.

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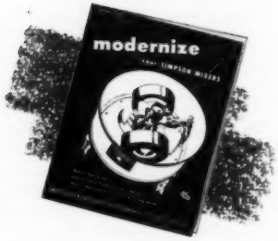

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IDEAS DEVELOP INDUSTRIES

IDEAS ARE THE SEEDS essential to the continued growth and development of an individual, a company, or an industry. The American Foundrymen's Society is a developer of technical ideas which advance the foundry industry and all those in it and is itself the outgrowth of an idea that has been the basis of A.F.S. operations since its formative days in 1896. This belief, that free and cooperative exchange of thoughts and information would develop the foundry industry, broke down the mental barrier which kept foundrymen from each other's shops and ideas. It demonstrated the now well recognized fact that the foundryman who closed his doors to protect supposedly "secret" processes was in turn isolating himself from progress. A sure way to failure for the individual, business, or society is secretiveness in scientific relationships.

This year, as they have each year since the Society's founding, North American foundrymen along with overseas colleagues will meet at the A.F.S. Annual Convention to trade ideas freely for their mutual benefit. Again, the A.F.S. Convention—held this year in Buffalo, N. Y., April 23-26—becomes the forum for the exchange of the best thoughts on foundry technology, accumulated from the Society's world-wide membership and filtered through its more than 100 technical committees.

Every foundry should be represented by as many men as can be spared from their operations and who have the capacity to learn from the presentation and discussion of the technical papers (nearly 90 are scheduled) which relate to that foundry's current and anticipated problems. Technical meetings, round table luncheons, shop courses, plant visitations—all provide unparalleled opportunity for the active foundryman searching for answers to his castings production problems.

Alert foundrymen recognize that they should not only participate in the A.F.S. Annual Convention to keep abreast of their industry's advances, but that they should take advantage of the continuing technical contacts that membership in the world's largest foundry society affords them. Members of the Society keep their technical wits sharpened and their knowledge of foundry practices expanding by study of the flow of ideas coming from fellow members of this vast technical organization.

All technical and supervisory men should be members of A.F.S. and all medium and large size foundries should have company or sustaining memberships to help promote this fine cooperative work.

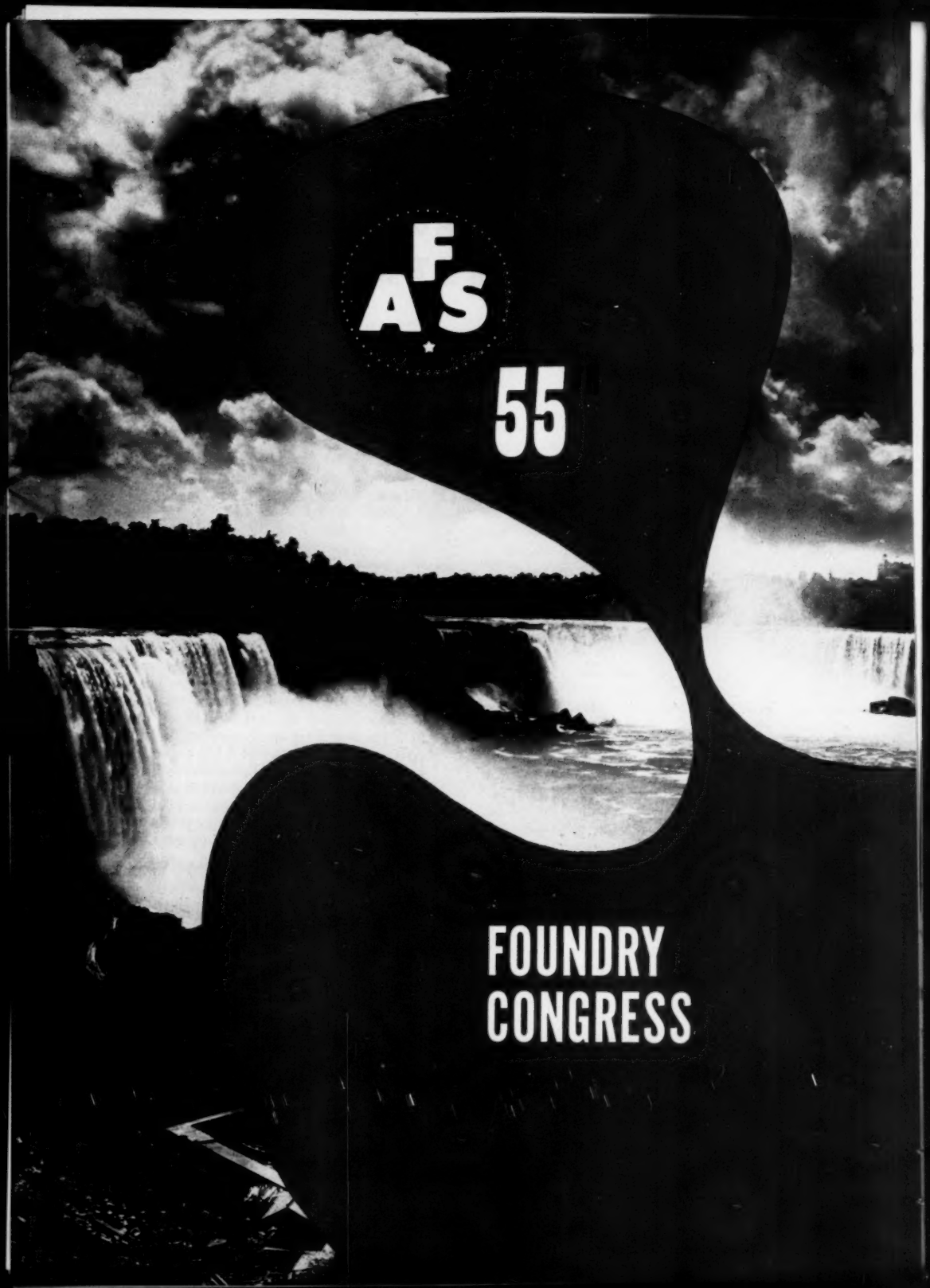
Such ideas are presented through the nearly 400 monthly meetings of the 40 A.F.S. chapters, the regional foundry conferences, the Annual Convention, and the Society's publications. As a publisher, A.F.S. provides the foundry industry with books, pamphlets, and bulletins on all phases of foundry technology, with the annually issued TRANSACTIONS, and with the AMERICAN FOUNDRYMAN, published monthly. These publications record the best in practical ideas, in research—sponsored by the Society or carried on independently, and the reports on A.F.S. committee studies.

For a foundryman or his employer to turn his back to this storehouse of facts, and to fail to participate in the development of the additional information so necessary in the present and future high production period is to ignore the most obvious insurance for greater foundry achievements—*new ideas.*

Walton L. Woody

WALTON L. WOODY
President
AMERICAN FOUNDRYMEN'S SOCIETY

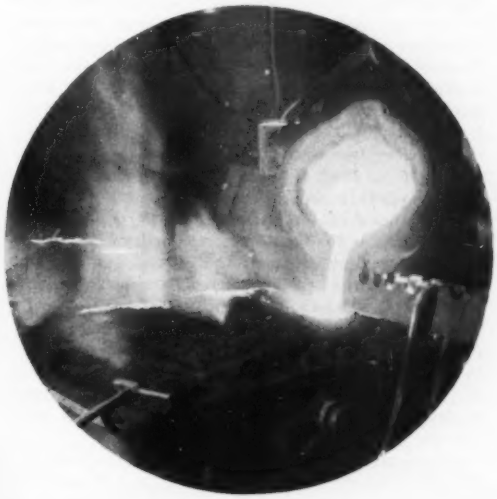
A.F.S. President Walton L. Woody, vice-president of National Malleable & Steel Castings Co., Cleveland, has been part of the company's management staff for many of the years he has been with the organization. He has spent his entire foundry career with National Malleable, having started as a student laboratory worker in 1914 after graduating from Rose Polytechnic Institute with a degree in chemical engineering. After a few months in the company's Indianapolis plant he was transferred to the Toledo plant for a short time in the same capacity. That same year Mr. Woody was appointed a chemist in the headquarters plant at Cleveland where he later became, successively, metallurgist, melter, and assistant superintendent. Following this he managed the Chicago, the Cleveland, and the Sharon plants before assuming his present position. President Woody is a Past National Director of the American Foundrymen's Society (1943-1945) and has been active in the A.F.S. Malleable Division and in other foundry organizations and manufacturing and management groups. In 1950 he inaugurated the drive for funds for a permanent society headquarters.


FAS
55
FOUNDRY
CONGRESS

TECHNOLOGY FOR DEFENSE will be the theme of the 55th A.F.S. Foundry Congress as the foundry world meets in Buffalo, April 23-26 to discuss newest techniques for the casting of metals. Foremost authorities on all phases of the foundry industry are scheduled to present papers on castings technology during four days of intensively-scheduled technical sessions, round tables, symposia and shop courses.

In addition to the four days of technical sessions, the 55th A.F.S. Convention will feature concurrent visits to Buffalo area foundries and a Ladies' Enter-

Featured event of the Convention's technical program will be a full-day's *"Symposium on Gating and Risering,"* to be held the morning and afternoon of Tuesday, April 24, and sponsored jointly by the A.F.S. Aluminum & Magnesium, Brass & Bronze, Gray Iron, Malleable and Steel Divisions. Top experts on this important phase of the metal castings industry will deal with the theoretical aspects of gating and risering in the morning session, while afternoon sessions will be in charge of divisional chairmen and will consist of successive half-hour discussions of gating



Buffalo, April 23 to 26 • 1951

and such annual highlight events as the A.F.S. Annual Business Meeting, followed by the Charles Edgar Hoyt Annual Lecture, the Society's Annual Banquet, the Canadian Dinner, the A.F.S Alumni Dinner (by invitation only), Aluminum & Magnesium Round Table Luncheon, Brass & Bronze Round Table Luncheon, Malleable Round Table Luncheon, Pattern Round Table Luncheon, Gray Iron Round Table Luncheon, Steel Round Table Luncheon, the Educational Dinner and the popular Gray Iron, Sand and Brass & Bronze Short Courses, held evenings and open to all foundrymen free-of-charge.

Officials of the National Production Authority, Washington, D. C., will meet at two luncheons with foundrymen and with foundry equipment manufacturers and suppliers. The Foundry Equipment & Supplies Industry Luncheon at 12:00 noon Tuesday, April 24, will bring together top NPA Foundry Equipment & Supplies Section officials and equipment manufacturers and suppliers. Defense Production Luncheon will afford all foundrymen, particularly those in top management, an opportunity to discuss National Defense efforts as related to the foundry industry with heads of NPA's Casting and Pig Iron Sections.

and risering as applied to each division—Aluminum & Magnesium, Gray Iron, Brass & Bronze, Malleable and Steel.

Annual Business Meeting of the Society will be held the afternoon of Wednesday, April 25, and will feature the President's Annual Address by Walton L. Woody, A.F.S. National Secretary-Treasurer Wm. W. Maloney's annual *"State of the Society"* report and awarding of prizes to first place winners in the A.F.S. National Apprentice Contest. Following the Annual Business Meeting, James C. Zeder, director of Engineering and Research, Chrysler Corporation, Detroit, will present the Convention's top technical address, the Charles Edgar Hoyt Annual Lecture. Mr. Zeder will speak on the subject of *"The Management of Industrial Research."*

Social highlight of the foundry year, the Annual Banquet of the Society, will climax the four-day Convention the evening of Thursday, April 26. A.F.S. Gold Medals and Honorary Life Memberships in the Society will be awarded six of the nation's foremost foundrymen and, concluding the Banquet and the Convention, Dr. Kenneth McFarland, nationally-known educator and public speaker, will blend humor, a timely topic and common sense in a talk, *"Which Knew Not Joseph."*

MONDAY, APRIL 23

Opening the four-day Convention on Monday at 10:00 a.m. will be an Aluminum & Magnesium session featuring presentation of papers on *"Melting of Aluminum and Magnesium Base Alloys,"* by L. W. Eastwood, Battelle Memorial Institute, Columbus, Ohio, and *"Fluid Mechanics Applied to Founding,"* by W. O. Wetmore and D. S. Richins, U. S. Naval Ordnance Test Station, Pasadena, Calif.

Brass & Bronze Session at 10:00 a.m. will have papers on *"Refining Secondary Copper Alloys,"* by Marvin Glassenburg and L. F. Mondolfo, Illinois Institute of Technology, and A. H. Hesse, R. Lavin & Sons, Inc., Chicago; and *"Radiography as an Assistant to Foundry Practice,"* by S. A. Brosky, Pittsburgh Testing Laboratory, and C. B. Johnson, Rockwell Mfg. Co., Pittsburgh. Concluding the session, J. O'Keefe, Jr., Exomet, Inc., Conneaut, Ohio, will speak on *"Riser Efficiency Increased by Insulation."*

Session on Heat Transfer at 10:00 a.m. Monday, will open with a paper, *"Freezing of White Cast Iron in Green Sand Molds,"* by H. A. Schwartz and W. K. Bock, National Malleable & Steel Castings Co., Cleveland; followed by *"Heat Flow in Moist Sands,"* Progress Report on Heat Transfer Research, to be presented by V. Paschkis, Columbia University.

Malleable session, at 10:00 a.m. will present *"Malleable Core Practice as Related to Foundry Losses,"* by E. J. Jory, National Malleable & Steel Castings Co., Cicero, Ill.; followed by *"Modern Core Sand Practice,"* by R. H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich.

Aluminum & Magnesium Round Table Luncheon will be held at 12:00 noon, Monday, April 23, and will feature discussion of *"Centrifugal Casting,"* with R. F. Cramer, General Electric Co., Schenectady, N. Y., as chairman, and J. W. Meier, Dept. of Mines and Technical Surveys, Ottawa, Ont., as co-chairman.

Also scheduled for noon April 23 is the Brass & Bronze Round Table Luncheon with B. A. Miller, Eddystone Div., Baldwin-Lima-Hamilton Corp., Eddystone, Pa., and H. L. Smith, Federated Metals Div., American Smelting & Refining Co., Pittsburgh, co-chairman, presiding over a discussion of *"Problems in Brass and Bronze Foundries."*

Opening Monday afternoon's technical program will be an Educational Session at 2:00 p.m. Speakers are R. W. Schroeder, University of Illinois, Navy Pier Branch, Chicago—*"Development of Foundry Courses in High and Trade Schools,"* and T. W. Russell, Jr., American Brake Shoe Co., New York—*"Industry Participation in Secondary School Training Programs for the Foundry."*

Second of the Heat Transfer sessions, at 2:00 p.m., Monday, will begin with a paper on *"Solidification of Steel Against Sand and Chill Walls,"* by F. A. Brandt and W. S. Pellini, Naval Research Laboratory, Washington, D. C., followed by *"Solidification of Gray Iron in Sand Molds,"* by R. P. Dunphy and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

Malleable session, 2:00 p.m., Monday, A[pril 23], will feature *"Relative Effects of Chromium and Manganese Contents on Rate of Anneal of Black Malleable Iron,"* by J. E. Rehder, Dept. of [Mines and] Technical Surveys, Ottawa, Ont., and *"Part I—Oxidation-Reduction Reactions Controlling the Composition of Molten Cast Iron,"* by R. W. Heine, University of Wisconsin, Madison, [Wis.]

Aluminum & Magnesium session at 2:00 p.m. Monday, April 23, will have three papers: *"Magnesium as a Die-Casting Material,"* by R. C. Cornell, Litemetal Diecast, Inc., Jackson, Mich.; *"Castability and Property Comparison of Several Magnesium-Rare Earth Sand Casting Alloys"* by K. [O.] Nelson and E. P. Strieter, Dow Chemical Co., Midland, Mich.; and *"The Modification [of] Aluminum-Silicon Alloys,"* offering [the] Foundrymen's Paper of the Institute of Australian [Foundrymen], to be presented by R. H. Dyke, Defence Research Laboratories, Marybirnong, Victoria.

Brass & Bronze session at 4:00 p.m., Monday, April [23], will feature *"U. S. Navy Non-Ferrous Development Program,"* by C. L. Prest, Navy Bureau of Ships, Wash-

DON'T MISS THESE!

EQUIPMENT & SUPPLIES MEETING
(Tuesday, April 24)

DEFENSE PRODUCTION MEETING
(Wednesday, April 25)

NPA Officials will be present to answer questions on DO orders, materials, and allocations.

(See Official Program for details)

ington, D. C.; and *"Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass and 88-8-4 Bronze,"* Progress Report of the A.F.S. Brass & Bronze Research Committee, by R. D. Shelleng, C. Upthegrove, and F. B. Rote, University of Michigan.

Malleable session, 4:00 p.m., April 23, will open with *"Part II—Oxidation-Reduction Principles Controlling the Composition of Molten Cast Irons,"* by R. W. Heine, University of Wisconsin; followed by *"Malleable Cast Iron Annealing Furnaces and Atmospheres,"* by O. E. Cullen and R. J. Light, Surface Combustion Corp., Toledo, Ohio.

Educational Dinner will be held at 7:00 p.m., Monday, April 23, with C. J. Freund, University of Detroit, speaking on *"What the College Graduate Can Do for the American Foundryman,"* and C. L. Carter, Albion Malleable Iron Co., Albion, Mich., speaking on *"Absorbing the Technical Trainee in Industry."*

Monday evening at 8:00, three of the popular Shop Courses will open their first sessions concurrently. Gray Iron Shop Courses will feature discussion of *"Air in the Cupola,"* with D. E. Krause, Gray Iron Research Institute, Columbus, Ohio, leading the discussion. Sand Shop Courses will deal with *"Malleable Foundry Sand Control,"* with E. E.Woodliff, Foundry Sand Service Engineering Co., Detroit, leading discussion. Brass & Bronze Sand Course discussion on *"Basic Approach to Sand Control for Copper Base Alloys—Part I"* will be led by Harry W. Dietert, Harry W. Dietert Co., Detroit. Shop Courses are open to all foundrymen gratis.

Foundry Congress

TUESDAY, APRIL 24

Technical highlight of the 55th A.F.S. Foundry Congress will be the *"Symposium on Principles of Gating,"* beginning Tuesday morning at 9:00 and lasting all day. The Symposium will be co-sponsored by the A.F.S. Aluminum & Magnesium, Brass & Bronze, Gray Iron, Malleable and Steel Divisions and the morning session will consist of successive half-hour talks on the theory of gating and risering. Lead-off speaker will be R. F. Thomson, General Motors Corp., Detroit, who will outline the purpose of the Symposium. Dr. Thomson will be followed by L. W. Eastwood, Battelle Memorial Institute, Columbus, who will speak on *"Tentative Design of Horizontal Gating Systems for Light Alloys,"* (Aluminum & Magnesium).

Steel Division's Symposium paper will be *"Relation of Casting Quality to Gating Practice,"* by W. H. Johnson, W. F. Bishop and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

Following a ten-minute recess, A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee, will present *"Considerations in the Feeding of Castings"* as the Brass & Bronze Division's portion of the program.

Concluding the morning session of the Symposium will be an *"Interim Report on Gray Iron Risering Research,"* presented on behalf of the Gray Iron Division by Howard F. Taylor and W. A. Schmidt of the Massachusetts Institute of Technology.

During the noon recess of the Symposium, Malleable Division will hold its Round Table Luncheon, with J. H. Lansing, Malleable Founders' Society; C. Boli, Northern Malleable Iron Co., St. Paul; and R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis., presiding over a panel discussion on *"Malleable Foundry Refractories."* William Ferrell, Auto specialties Mfg. Co., St. Joseph, Mich., will lead the panel discussion.

Also to be held at noon, Tuesday, April 24 will be the Foundry Equipment and Supplies Industry Luncheon, when members of that industry will meet with National Production Authority officials and hear Aubrey J. Grindle, chief, Foundry Equipment and Supplies Section, NPA, Washington; and Thomas Kaveny, Jr., Herman Pneumatic Machine Co., Pittsburgh, industry consultant to NPA's Foundry Equipment and Supplies Section, discuss the present and future role of the industry in national defense.

"Symposium on Principles of Gating" will resume for its second and final session at 2:00 p.m., Tuesday, April 24. Presiding will be R. F. Thomson, General Motors Corp., Detroit, with W. E. Sicha, Aluminum Co. of America (Aluminum & Magnesium); W. S. Pellini, Naval Research Laboratory, Washington, D. C. (Steel); G. P. Halliwell, H. Kramer & Co., Chicago (Brass & Bronze); F. J. Walls, International Nickel Co., Detroit (Gray Iron) and R. P. Schauss, Illinois Clay Products Co., Chicago (Malleable) presiding over successive half-hour discussions of gating and risering as applied to their respective technical divisions of A.F.S.

First half-hour discussion period will be lead by

T. E. Kramer, Wm. F. Jobbins, Inc., Aurora, Ill., (Steel) followed successively by J. B. Caine, foundry consultant, Wyoming, Ohio, and J. H. Lowe, Wehr Steel Co., Milwaukee (Brass & Bronze); F. G. Sefing, International Nickel Co., New York, speaking on *"The Why of Gate and Feeder Design,"* with discussion led by Harry Kessler, Sorbo-Mat Process Engineers, St. Louis (Gray Iron); E. C. Zirzow, Deere & Co., Moline, Ill., speaking on *"Trends in Malleable Gating and Risering"* and C. C. Lawson, Wagner Malleable Iron Co., Decatur, Ill., on *"Developments in Gating of Small to Medium Malleable Castings"* (Malleable), concluding the Symposium.

First Sand Division session will begin at 4:00 p.m., Tuesday, April 24, with *"Compaction Studies of Molding Sands,"* by R. E. Grim and W. D. Johns, Jr., State Geological Survey, University of Illinois, Urbana, followed by *"Effects of Sand Grain Distribution on Casting Finish,"* by H. H. Fairfield and James MacConachie, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont., Canada.

Timestudy and Methods session at 4:00 p.m. April 24, will feature *"Fatigue Data Summary, Report No. 2,"* to be presented by M. E. Annich of American Brake Shoe Co., Mahwah, N. J.

Tuesday evening at 7:00, the Annual Canadian Dinner will be held in the Niagara Room of the Statler Hotel with A.F.S. National Director J. J. McFadyen, Galt Malleable Iron Co., Galt, Ont., Canada, presiding. An A.F.S. tradition, the Canadian Dinner provides an annual get-together for members of the three A.F.S. Canadian chapters.

At 8:00 p.m., Tuesday, April 24, concluding the day's technical activities will be the second series of Shop Course sessions, open to all foundrymen free of charge. Brass and Bronze Sand Course will feature discussion of *"Basic Approach to Sand Control for Copper-Base Alloys—Part II—Hot and Retained Properties,"* led by Harry W. Dietert, Harry W. Dietert Co., Detroit. Gray Iron Shop Course discussion will be on *"Melting Gray Iron in a Reverberatory-Type Furnace"* and will be led by J. G. Winget, Reda Pump Co., Bartlesville, Ohio. Sand Shop Course discussion will deal with *"Shell Molding and Use of Resin Binders,"* led by B. N. Ames, New York Naval Shipyard, Brooklyn, and W. C. Jeffrey, Jackson Industries, Birmingham, Ala.

WEDNESDAY, APRIL 25

Opening technical session of the third day of the Convention will be a Brass & Bronze session at 10:00 a.m. First session paper will be *"Effects of Certain Elements on Grain Size of Cast Copper-Base Alloys,"* by R. A. Colton and M. Margolis, American Smelting & Refining Co., Barber, N. J. Second session paper will be *"Manufacture of Bronze Boiler Drop Plugs,"* by B. F. Kline and J. R. Davidson, Southern Pacific Railroad Co., Sacramento, Calif.

Foundry Cost Session at 10:00 a.m. will present *"'Spec' Sheets and Their Various Uses,"* by John Taylor, Lester B. Knight & Associates, Inc., Chicago; followed by *"A New Method of Evaluating Costs in Jobbing Foundries,"* by A. W. Schneble, Jr., Advance Foundry Co., Dayton, Ohio and C. E. McQuiston, Engineering Dept., Ohio State University, Columbus.

Gray Iron session, 10:00 a.m., Wednesday, April 25, will have three papers: *"Influence of Silicon Content on Mechanical and High-Temperature Properties of Nodular Cast Iron,"* by W. H. White, Jackson Iron & Steel Co., Jackson, Ohio; L. P. Rice and A. R. Elsea, Battelle Memorial Institute, Columbus; *"Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron,"* by J. E Rehder, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada; and *"Some Effects of Temperature and Melting Variables on Chemical Composition and Structure of Gray Irons,"* by E. A. Lange and R. W. Heine, University of Wisconsin, Madison.

Sand session, 10:00 a.m., Wednesday, April 25, has three papers scheduled: *"Metal Penetration—Report of A.F.S. Mold Surface Committee,"* to be presented by S. L. Gertsman and A. E. Murton, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada; *"The Determination of Metal Penetration in Sand Molds,"* by H. J. Gonya and D. C. Ekey, Ohio State University; and *"Effect of Fluid Metal Pressure on Penetration Defects,"* Sand Research Progress Report by C. C. Sigerfoos, Michigan State College.

Defense Production Luncheon

Defense Production Luncheon will be held at noon on April 25 in the Chinese Room of the Statler Hotel and will afford foundrymen, particularly those in top management brackets, the opportunity to meet and discuss the foundry industry's role in national defense with top officials of the National Production Authority. Open to all foundrymen, the luncheon will have as its speakers A. J. McDonald, vice-president, American Steel Foundries, East Chicago, Ind., Chief, NPA Castings Section; and John A. Clausen, consultant, American Iron & Steel Institute, New York, Chief, NPA Pig Iron Section; Lieut. Comdr. William A. Meissner, Bureau of Ships; and Nigel Bell, Light Metals Division, NPA, all of Washington, D. C.

Annual Business Meeting of the Society will be held in the Ballroom of the Statler Hotel at 2:00 p.m., Wednesday, April 25, and will feature A.F.S. President Walton L. Woody's Annual Address, A.F.S. National Secretary-Treasurer Wm. W. Maloney's *"State of the Society"* report to the membership, and presentation by President Woody of cash awards to first place winners in the 28th A.F.S. National Apprentice Contest. Concluding the Annual Business Meeting will be election of National Officers and Directors of A.F.S.

Following the Annual Business Meeting will be the year's top foundry technical address, the Charles Edgar Hoyt Annual Lecture. This year's Hoyt Lecturer is James C. Zeder, director of Engineering and Research, Chrysler Corp., Detroit, who will speak on *"The Management of Industrial Research."*

Plant & Plant Equipment session will be held at 4:00 p.m., Wednesday, April 25. Speakers are Leslie N. Schuman, National Malleable & Steel Castings Co., Cleveland—*"Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings,"* and K. M. Smith, Caterpillar Tractor Co., Peoria, Ill.—*"Dimensional Checking and Pressure Testing of Gray Iron Castings."*

Refractories session at 4:00 p.m., Wednesday, will feature *"Ladle Refractories and Practice in Acid Electric Steel Foundry,"* to be given by Clyde Wyman, Burnside Steel Foundry Co., Chicago.

Sand Session, 4:00 p.m., Wednesday, April 25, will have two papers: *"Some Notes on Core Oil Testing,"* by A. E. Murton, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada, H. H. Fairfield, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont., Canada, and B. Richardson, Steel Castings Institute of Canada, Ottawa, Ont.; and *"Recent Advances in Dielectric Core Baking,"* by J. Wesley Cable, Thermex Division, Girdler Corp., Louisville, Ky.

An evening Plant & Plant Equipment session at 8:00 p. m., Wednesday, April 25, will have as its speakers C. H. Hastings, Watertown Arsenal, Mass.–*"Choosing Equipment for Nondestructive Testing"*; and H. C. Weimer of Beardsley & Piper Division, Pettibone Mulliken Corp., Chicago, will present a new motion picture–*"Mechanization in Molding."*

Last of three Gray Iron and Sand Shop Courses will be given at 8:00 p.m. Wednesday evening. Gray Iron Shop Course will feature discussion of *"Metal Pouring Temperature Control,"* led by R. A. Clark, Electro Metallurgical Division, Union Carbide & Carbon Corp., Detroit. Final Sand Shop Course discussion will be on *"Foundry Sand Control,"* and will be led by C. B. Schureman, Baroid Sales Division, National Lead Co., Chicago.

THURSDAY, APRIL 26

Last day of the Convention, Thursday, April 26, will open at 10:00 a.m. with a Gray Iron session. The first session presentation will be the official Exchange Paper of the Institute of British Foundrymen, *"Basic Cupola Melting and Its Possibilities,"* to be presented by E. S. Renshaw, Ford Motor Co., Dagenham, England. Second session paper will be *"Effect of Slag Analysis on Cupola Operation,"* by R. A. Flinn, American Brake Shoe Co., Mahwah, N. J.

Steel session at 10:00 a.m., Thursday, will feature three papers: *"Precoat Materials for Investment Casting,"* by W. F. Davenport and A. Strott, Wright-Patterson Airfield, Dayton, Ohio; *"Contribution of Riser and Casting Edge Effects to Soundness of Cast Steel Plate,"* by H. F. Bishop, E. T. Myskowski and W. S. Pellini, Naval Research Laboratory, Washington, D. C.; and *"An Investigation of the Penetration of Steel into Molding Sands,"* the first official Exchange Paper from Sweden's Metallografiska Institutet to an A.F.S. Convention. Written by Holger Pettersson, Stockholm, the paper will be presented by J. A. Rassenfoss of American Steel Foundries.

Gray Iron Round Table Luncheon, to be held at noon, Thursday, will have discussion of *"Gray Iron Melting With Materials Available,"* led by J. F. Dobbs, New York Air Brake Co., Watertown, N. Y., and S. A. Kundrat, Homestead Valve Mfg. Co.

Also to be held at noon, Thursday, is the Steel Round Table Luncheon, with V. E. Zang, Unitcast Corp., Toledo, Ohio, and D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn., presiding. Subjects to be covered in open discussion during the luncheon will include *"Alloy Substitutions and Conversions," "Increasing Casting and Total Yield," "Sulphur,"* and *"Acid vs. Basic Practice."*

Thursday afternoon's technical program will open with a Gray Iron session at 2:00. Papers to be presented are: *"Structure and Mechanical Properties of a Mo-Ni-Cr Cast Iron,"* by E. A. Loria, formerly with Mellon Institute and now with Carborundum Co., Niagara Falls, N. Y.; *"Kinetics of Graphitization in Cast Iron,"* by B. F. Brown and M. F. Hawkes, North Carolina State College of Agriculture and Engineering, University of North Carolina; and *"Isothermal Transformation Characteristics on Direct Cooling of Alloyed White Iron,"* by F. B. Rote and G. A. Conger, University of Michigan, Ann Arbor, and K. A. DeLonge, International Nickel Co., Bayonne, N. J.

Steel session at 2:00 p.m. will also have three papers: *"Effect of Vanadium on Properties of cast Chromium-Molybdenum Steels,"* by N. A. Ziegler, W. L. Meinhart and J. R. Goldsmith, Crane Co., Chicago; *"The "Effect of Segregation on Mechanical Properties of Cast Steel,"* by John Wallace, Watertown Arsenal, Mass., and Howard F. Taylor, Massachusetts Institute of Technology; and *"Usefulness and Ill Effects of Gases in Metallurgy,"* by Dr. E. Spire, Canadian Liquid Air Co., Montreal.

Gray Iron session, 4:00 p.m., Thursday, April 26, will have as its speakers W. W. Austin, Southern Research Institute, Birmingham–*"Improvement of Machinability in High-Phosphorus Gray Cast Iron–Part II"*; D. E. Krause, Gray Iron Research Institute, Columbus, Ohio–*"Chill Tests and the Metallurgy of Gray Iron"*; and R. A. Clark, Electro Metallurgical Division, Union Carbide & Carbon Corp., *"Silicon-Chromium Alloy in Complicated Iron Castings."*

Concluding technical session of the 55th A.F.S. Convention will be a Sand session at 4:00 p.m., Thursday, April 26, with A. I. Krynitsky and F. W. Raring of the National Bureau of Standards, Washington, D. C., speaking on *"Silica Sands–Sieve Analyses"*; and W. H. Moore, Meehanite Corp., Cleveland Heights, Ohio, on *"Testing of Sand Under Impact."*

Climaxing the 55th A.F.S. Convention will be the Annual Banquet of the American Foundrymen's Society Thursday evening, April 26. Highlight social event of the foundry year, the Banquet will feature presentation of A.F.S. Gold Medals and Honorary Life Memberships to six of the nation's outstanding foundrymen. Banquet speaker will be Dr. Kenneth McFarland of Topeka, Kansas, a national figure in the fields of education and public speaking. Dr. McFarland, will combine wisdom and humor in the climax Convention address–*"Which Knew Not Joseph."*

Running concurrently with the four days of intensively-scheduled technical sessions will be a Plant Visitation Program, arranged by Western New York Chapter's Plant Visitations Committee and which will include open houses at 15 Buffalo area foundries.

Ladies of the foundry world, too, are welcome at the 55th A.F.S. Foundry Congress, and their hostesses, distaff "members" of the Western New York Chapter, have arranged for four delightful days of sightseeing and social activities to entertain foundrywomen while foundrymen of the 55th A.F.S. Convention meet to exchange the technical knowledge that has become a vital part of the industry's progress.

GOLD MEDAL *Awards*

To
ALFRED A. BOYLES
The
JOHN H. WHITING GOLD MEDAL

"for fundamental studies on the mechanization of graphitization of gray cast iron."

Mr. Boyles, since his graduation from the University of North Carolina in 1924 has been of outstanding service to the foundry industry for his work in fundamental metallurgical research and in the metallography of gray cast iron. He began his career as a chemist for the Tennessee Coal, Iron and Railroad Co., in 1924, and was later affiliated with Battelle Memorial Institute as test engineer and research metallurgist. In 1941 Mr. Boyles joined the research department of the United States Pipe & Foundry Co. He is the author of many works on ferrous metallurgy and metallography of cast iron, including THE STRUCTURE OF CAST IRON (Amer[illegible] for Metals).

HONORARY LIFE MEMBERSHIPS

[illegible] BEACH
[illegible]RARY
[illegible]BERSHIP

[illegible]ciety and to the [illegible]ing."

[illegible]ry engineering and [illegible]among many notable [illegible], with first applying [illegible]ns to molding machine [illegible]tor of A.F.S., Mr. Beach [illegible] an indentured apprentice [illegible]ent last year was, succes-[illegible]rers Foundry Co.; president [illegible] Co.; vice-president of Warren [illegible] some 25 years as an engineer-[illegible], Wyant & Cannon Foundry Co.

To
VICTOR A. CROSBY
The
JOHN A. PENTON
GOLD MEDAL

"for outstanding service to the Society and for his contributions to the dissemination of information relating to ferrous foundry metallurgy."

Mr. Crosby is chairman of the American Foundrymen's Society's Gray Iron Division and has for many years been active in formulating new ferrous foundry techniques and in dissemination of information relative to ferrous casting practices. Metallurgical engineer for the Climax Molybdenum Co., Detroit, since 1934, Mr. Crosby is a graduate of the University of Mississippi and served as an officer in World War I. Following the war, he became metallurgist and later chief metallurgist for Packard Motor Car Co., Detroit, resigning to become foundry metallurgist with Studebaker Corp., South Bend, Ind., for 12 years prior to joining Climax Molybdenum. Mr. Crosby is well-known to A.F.S. members for his frequent appearances as a speaker.

To
THOMAS W. CURRY
The
PETER L. SIMPSON
GOLD MEDAL

"for outstanding work and contributions to the field of foundry sand technology."

Mr. Curry, who is metallurgist for the Lynchburg Foundry Co., Lynchburg, Va., is widely-known as a speaker on various phases of sand technology at Chapter, Regional and National meetings of A.F.S. and as a frequent contributor to the technical press. Holder of a B.S. in metallurgical engineering from Pennsylvania State College, Mr. Curry began his foundry career as metallurgist and, later, foundry superintendent for Kennedy Van Saun Mfg. Corp., Danville, Pa. Mr. Curry was assistant foundry superintendent for the York Corp., York, Pa., in 1943, when he resigned to become metallurgist at Lynchburg Foundry Co., Lynchburg, Virginia, his present position.

To
EDWARD J. McAFEE
HONORARY
LIFE MEMBERSHIP

"for outstanding service to the Society and to the foundry industry in the development of patternmaking materials and applications."

Mr. McAfee, in addition to his contributions to the technology of foundry patternmaking, has for many years been prominent in encouraging young men to enter the foundry industry and is an active participant in A.F.S. work. A patternmaker since 1907, Mr. McAfee joined Puget Sound Naval Shipyard, Bremerton, Wash., as a patternmaker in 1916, becoming Master Patternmaker in 1938. Mr. McAfee received the Navy's Meritorious Civilian Award in 1949 for his work in producing new patternmaking methods. He is co-author of the PATTERNMAKERS' MANUAL.

To
WALTON L. WOODY
HONORARY
LIFE MEMBERSHIP

"upon completion of his term as National President of the American Foundrymen's Society."

A.F.S. National President Walton L. Woody, during his term as head of the Society has instituted many far-reaching plans and policies for the benefit of the American Foundrymen's Society, perhaps the best known of which is the formulation of plans and the raising of funds for a permanent National Headquarters for the Society. In addition to his many duties as President, Mr. Woody has found time during his term of office to speak at many chapter, regional and national meetings of the Society.

55TH SPEAKERS

HOYT LECTURER
James C. Zeder

55TH *Convention Program* and

troit, and National President of the Society of Automotive Engineers.

Annual Banquet Speaker will be Dr. Kenneth McFarland of Topeka, Kansas, nationally-known school executive and public speaker, who will present the intriguingly-titled and Biblical-inspired Banquet Address, *"Which Knew Not Joseph."*

Mr. Zeder, whose selection as Hoyt Lecturer is one of the highest honors bestowed by the American Foundrymen's Society, will speak on *"The Management of Industrial Research."* Called "an engineer's engineer," Mr. Zeder has few peers in the field of industrial research and has been accorded highest honors and has held highest offices in engineering technical societies.

Mr. Zeder has been connected with Chrysler Corporation since its formation in 1925, when he was named head of its Mechanical Laboratory. He subsequently was named chief engineer of the Plymouth and DeSoto Divisions, assistant chief engineer in charge of all Chrysler Laboratories and later chief engineer. When Chrysler formed an Engineering Board in 1946, Mr. Zeder was named chairman, and in May of last year was appointed director of Engineering and Research for Chrysler Corp. He has also been president of the Chrysler Institute of Engineering since 1947.

In addition to his duties at Chrysler Corporation, Mr. Zeder served as chairman of the SAE War Engineering Board during World War II, is a founder and past chairman of the SAE Technical Board and is the author of

education. As a speaker, his extensive travels have given him a broad, first-hand knowledge of America and industry. This knowledge has placed Dr. McFarland in demand as a speaker and consultant in many fields and he is well-known for his lectures on personnel administration, public relations and salesmanship.

In addition to holding office as Superintendent of Schools, Topeka, Kansas, Dr. McFarland's talks, compounded of information, inspiration and humor, have made him one of America's most popular speakers. He is retained by General Motors Corporation as one of its guest speakers and is the only man selected to serve as guest lecturer for the *Reader's Digest* magazine.

With his extensive background in many fields and his nationally-known speaking talents, Dr. McFarland promises to make his talk, *"Which Knew Not Joseph,"* a memorable climax to the 55th A.F.S. Foundry Congress.

55TH Convention Program and

Program Personalities

W. D. McMillan

W. G. Ferrell

L. N. Schuman

APRIL 23 TO 26 1951

MONDAY, APRIL 23

8:30 AM—Registration Begins

10:00 AM (A)—Aluminum and Magnesium Session

(Sponsored by Aluminum and Magnesium Division)

Presiding—J. J. Warga, Piasecki Helicopter Corp.

Co-Chairman—P. J. Scherbner, Sperry Gyroscope Corp., Great Neck, Long Island, N. Y.

"Melting Aluminum and Magnesium Base Alloys"—L. W. Eastwood, Battelle Memorial Institute, Columbus.

"Fluid Mechanics Applied to Founding"—W. O. Wetmore and D. S. Richins, U. S. Naval Ordnance Test Station, Pasadena, Calif.

10:00 AM (B)—Heat Transfer Session

(Sponsored by Heat Transfer Committee)

Presiding—H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland.

Co-Chairman—E. C. Troy, Foundry Engineer, Palmyra, N. J.

"Freezing of White Cast Iron in Green Sand Molds"—H. A. Schwartz and W. K. Bock, National Malleable and Steel Castings Co., Cleveland.

"Heat Flow in Moist Sands"—Progress Report, Heat Transfer Research—V. Paschkis, Columbia University, New York.

Jeffery

K. A. DeLonge

R. Dyke

Victor Rowell

MONDAY, APRIL 23 (cont'd)

10:00 AM (C)—Malleable Session

(Sponsored by Malleable Division)

Presiding—E. C. Zirzow, Deere & Co., Moline, Ill.

Co-Chairman—F. J. Pfarr, Lake City Malleable Co., Cleveland.

"Malleable Core Practice as Related to Foundry Losses"—E. J. Jory, National Malleable and Steel Castings Co., Cicero, Ill.

"Modern Core Sand Practice"—R. H. Greenlee, Auto Specialties Mfg. Co., St. Joseph, Mich.

10:00 AM (D)—Brass and Bronze Session

(Sponsored by Brass and Bronze Division)

Presiding—W. B. Scott, American Brake Shoe Co., National Bearing Div., Meadville, Pa.

Co-Chairman—H. G. Schwab, Bunting Brass & Bronze Co., Toledo, Ohio.

"Refining Secondary Copper Alloys"—Marvin Glassenberg and L. F. Mondolfo, Illinois Institute of Technology, Chicago, and A. H. Hesse, R. Lavin & Sons, Inc., Chicago.

"Radiography as an Assistant to Foundry Practice"—S. A. Brosky, Pittsburgh Testing Laboratory, and C. B. Johnson, Rockwell Manufacturing Co., Pittsburgh.

"Riser Efficiency Increased by Insulation"—J. O'Keefe, Jr., Exomet, Inc., Conneaut, Ohio.

12:00 Noon (A)—Aluminum and Magnesium Round Table Luncheon

(Sponsored by Aluminum and Magnesium Division)

Presiding—R. F. Cramer, General Electric Co., Schenectady.

Co-Chairman—J. W. Meier, Dept. of Mines and Technical Surveys, Ottawa, Canada.

Subject: *"Centrifugal Casting."*

12:00 Noon (B)—Brass and Bronze Round Table Luncheon

(Sponsored by Brass and Bronze Division)

Presiding—B. A. Miller, Baldwin-Lima-Hamilton Corp., Eddystone Div., Philadelphia.

Co-Chairman—H. L. Smith, Federated Metals Div. American Smelting & Refining Co., Pittsburgh.

Subject: *"Problems in Brass and Bronze Foundries."*

2:00 PM (A)—Educational Session

(Sponsored by Educational Division)

Presiding—W. H. Ruten, Polytechnic Institute of Brooklyn, N. Y.

Co-Chairman—B. D. Claffey, Acme Aluminum Alloys, Inc., Dayton.

"Development of Foundry Courses in High and Trade Schools"—R. W. Schroeder, University of Illinois.

"Industry Participation in Secondary School Training Programs for the Foundry"—T. W. Russell, Jr., American Brake Shoe Co., New York.

MONDAY, APRIL 23 (cont'd)

2:00 PM (B)—Heat Transfer Session

(Sponsored by Heat Transfer Committee)

Presiding—H. A. Schwartz, National Malleable and Steel Castings Co., Cleveland.

Co-Chairman—E. C. Troy, Foundry Engineer, Palmyra, N. J.

"Solidification of Steel Against Sand and Chill Walls"—H. F. Bishop, F. A. Brandt and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

"Solidification of Gray Iron in Sand Molds"—R. P. Dunphy and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

2:00 PM (C)—Malleable Session

(Sponsored by Malleable Division)

Presiding—C. F. Lauenstein, Link-Belt Co., Indianapolis, Ind.

Co-Chairman—F. Coghlin, Jr., Albion Malleable Iron Co., Albion, Mich.

"Relative Effects of Chromium and Silicon Contents on Rate of Anneal of Black-Heart Malleable Iron"—J. E. Rehder, Dept. of Mines and Technical Surveys, Ottawa, Canada.

"Part I—Oxidation-Reduction Principles controlling the Composition of Molten Cast Irons"—R. W. Heine, University of Wisconsin, Madison.

4:00 PM (A)—Malleable Session

(Sponsored by Malleable Division)

Presiding—W. D. McMillan, International Harvester Co., Chicago.

Co-Chairman—Wm. Zeunik, National Malleable Steel Castings Co., Indianapolis, Ind.

"Part II—Oxidation-Reduction Principles Controlling the Composition of Molten Cast Irons"—R. W. Heine, University of Wisconsin, Madison.

"Malleable Cast Iron Annealing Furnaces and Atmospheres"—O. E. Cullen and R. J. Light, Surface Combustion Corp., Toledo.

4:00 PM (B)—Brass and Bronze Session

(Sponsored by Brass and Bronze Division)

Presiding—B. N. Ames, New York Naval Shipyard, Brooklyn.

Co-Chairman—John W. Bolton, The Lunkenheimer Co., Cincinnati.

"U. S. Navy Non-Ferrous Development Program"—C. L. Frear, Bureau of Ships, Dept. of Navy, Washington, D. C.

"Melt Quality and Fracture Characteristics of 85-5-5-5 Red Brass and 88-8-4 Bronze"—A.F.S. Research Report—R. D. Shelleng, C. Upthegrove and F. B. Rote, University of Michigan, Ann Arbor.

4:00 PM (C)—Aluminum and Magnesium Session

(Sponsored by Aluminum and Magnesium Division)

Presiding—M. E. Brooks, The Dow Chemical Co., Bay City, Mich.

Co-Chairman—W. D. Danks, Howard Foundry, Chicago.

"Magnesium as a Die Casting Material"—R. [illegible], Litemetal Diecast, Inc., Jackson, Michi[illegible]

"Castability and Property Comparison of [illegible] nesium-Rare Earth Sand Casting Alloys"—K. E. Nelson and F. P. Strieter, The Dow Chemical Co., Midland, Mich.

"The Modification Technique of Aluminum-Silicon Alloys"—Official Exchange Paper from The Institute of Australian Foundrymen—R. H. Dyke, Defence Research Laboratories, Marybirnong, Victoria.

5:30 PM—Registration Closes

7:00 PM—Educational Dinner

(Sponsored by Educational Division)

Presiding—G. J. Barker, University of Wisconsin, Madison.

Co-Chairman—G. K. Dreher, Foundry Educational Foundation, Cleveland.

Speakers: C. J. Freund, University of Detroit, Detroit. *"What the College Graduate Can Do for the American Foundryman."*

C. L. Carter, Albion Malleable Iron Co., Albion, Mich. *"Absorbing the Technical Trainee in Industry."*

7:00 PM—Non-Ferrous Foundry Industry Dinner

(Sponsored by Non-Ferrous Founders' Society)

N. A. Ziegeler

G. K. Dreher

V. A. Crosby

H. H. Fairfield

W. W. Levi

J. B. Caine

R. H. Jacoby

S. L. Gertsman

M. E. Brooks

W. Zeunik

C. C. Sigerfoos

R. P. Schauss

R. A. Colton

E. C. Zirzow

J. E. Rehder

H. H. Kessler

A. R. Elsea

K. E. Nelson

MONDAY, APRIL 23 (cont'd)

8:00 PM (A)—Brass and Bronze Sand Course

(Sponsored by Brass and Bronze Division)

Presiding—W. W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee.

Subject: *"Basic Approach to Sand Control for Copper Base Alloy—Part I—Structural, Green, Air Set and Dry Properties."*

Discussion Leader: H. W. Dietert, H. W. Dietert Co.

8:00 PM (B)—Gray Iron Shop Course

(Sponsored by Gray Iron Division)

Presiding—W. W. Levi, Lynchburg Foundry Co., Radford, Va.

Co-Chairman—E. J. Burke, Hanna Furnace Co., Buffalo.

Subject: *"Air in the Cupola."*

Discussion Leader: D. E. Krause, Gray Iron Research Institute, Inc., Columbus.

8:00 PM (C)—Sand Shop Course

(Sponsored by Sand Division)

Presiding—F. S. Brewster, Harry W. Dietert Co., Detroit.

Co-Chairman—E. L. Thomas, Cadillac Motor Car Co., Detroit.

Subject: *"Malleable Foundry Sand Control."*

Discussion Leader: E. E. Woodliff, Foundry Sand Service Engineering Co., Detroit.

TUESDAY, APRIL 24

8:30 AM—Registration Opens

9:00 AM—*Symposium on "Principles of Gating."*

(Jointly sponsored by Aluminum and Magnesium, Brass and Bronze, Gray Iron, Malleable and Steel Divisions)

Presiding—R. F. Thomson, Research Laboratories Division, General Motors Corp., Detroit.

Co-Chairmen: Aluminum and Magnesium Division, W. E. Sicha, Aluminum Co. of America, Cleveland; *Steel Division,* W. S. Pellini, Naval Research Laboratory, Washington, D. C.; *Brass and Bronze Division,* G. P. Halliwell, H. Kramer & Co., Chicago; *Gray Iron Division,* F. J. Walls, Int'l Nickel Co., Detroit; *Malleable Division,* R. P. Schauss, Illinois Clay Products Co., Chicago.

Introduction—*"Purpose of Symposium,"* R. F. Thomson.

(Aluminum and Magnesium Division)

"Tentative Design of Horizontal Gating Systems for Light Alloys"—L. W. Eastwood, Battelle Memorial Institute, Columbus.

(Steel Division)

"Relation of Casting Quality to Gating Practice"—W. H. Johnson, H. F. Bishop and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

(Brass and Bronze Division)

"Considerations in the Feeding of Castings"— A. K. Higgins, Allis-Chalmers Mfg. Co., Milwaukee.

(Gray Iron Division)

"Interim Report on Gray Iron Risering Research"—H. F. Taylor and W. A. Schmidt, Massachusetts Institute of Technology, Cambridge.

TUESDAY, APRIL 24 (cont'd)

12:00 Noon—FOUNDRY EQUIPMENT & SUPPLIES LUNCHEON

(Sponsored by Foundry Equipment Manufacturers Ass'n. and Foundry Facings Manufacturers Ass'n.)

Presiding—C. V. Nass, Chicago, President, Foundry Equipment Manufacturers Ass'n.

Co-Chairman—F. B. Flynn, Chicago, President, Foundry Facings Manufacturers Ass'n.

Speakers—Aubrey J. Grindle, Director, Foundry Equipment and Supplies Section, Machinery Div., N. P. A., Washington, D. C., and Thos. Kaveny, Jr., Herman Pneumatic Machine Co., Pittsburgh, Pa., Industry Consultant to Foundry Equipment & Supplies Section, Machinery Div., N. P. A.

12:00 Noon—Malleable Round Table Luncheon

(Sponsored by Malleable Division)

Co-Chairmen—J. H. Lansing, Malleable Founders' Society, Cleveland; R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.; G. Boli, Northern Malleable Iron Co., St. Paul.

Subjects: Panel Discussions—*"Malleable Foundry Refractories," "Experimental Work on Core and Mold Materials."*

Discussion Leader: Wm. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.

2:00 PM—Symposium on "Principles of Gating"

(Jointly sponsored by Aluminum and Magnesium, Brass and Bronze, Gray Iron, Malleable and Steel Divisions)

Presiding—R. F. Thomson, Research Laboratories Division, General Motors Corp., Detroit.

Co-Chairmen—Aluminum and Magnesium Division, W. E. Sicha, Aluminum Co. of America, Cleveland; *Steel Division*, W. S. Pellini, Naval Research Laboratory, Washington, D. C.; *Brass and Bronze Division*, G. P. Halliwell, H. Kramer & Co., Chicago; *Gray Iron Division*, F. J. Walls, International Nickel Co.; *Malleable Division*, R. P. Schauss, Illinois Clay Products Co., Chicago.

(Aluminum and Magnesium Division)

Discussion by T. E. Kramer, Wm. F. Jobbins. Inc., Aurora, Ill.

(Steel Division)

Discussion by J. B. Caine, Foundry Consultant, Wyoming, Ohio, and J. H. Lowe, Wehr Steel Co., Milwaukee.

(Brass and Bronze Division)

Discussion by B. N. Ames, N. Y. Naval Shipyard, Brooklyn, and W. W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee.

(Gray Iron Division)

"The Why of Gate and Feeder Design"—F. G. Sefing, International Nickel Co., New York.

Discussion by H. H. Kessler, Sorbo-Mat Process Engineers, St. Louis, Mo.

(Malleable Division)

"Trends in Malleable Gating and Risering"—P. Zirzow, Deere & Co., Moline, Ill.

"Developments in Gating of Small to Me leable Castings"—C. C. Lawson, Wagn Iron Co., Decatur, Ill.

4:00 PM (A)—Pattern Session

(Sponsored by Pattern Division)

4:00 PM (B)—Sand Session

(Sponsored by Sand Division)

Presiding—J. B. Caine, Foundry Consultant, Wyoming, Ohio.

Co-Chairman—R. H. Jacoby, The Key Company, E. St. Louis, Ill.

"Compaction Studies of Molding Sands"—R. E. Grim and W. D. Johns, Jr., State Geological Survey, University of Illinois, Urbana.

"Effect of Sand Grain Distribution on Casting Finish"—H. H. Fairfield and James MacConachie, Wm. Kennedy & Sons Ltd., Owen Sound, Ont.

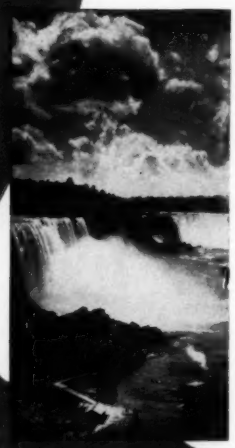
4:00 PM (C)—Timestudy and Methods Session

(Sponsored by Timestudy and Methods Committee)

Presiding—M. T. Sell, Sterling Foundry, Wellington, Ohio

Co-Chairman—H. R. Williams, Williams Management Engineering, Milwaukee.

"Fatigue Data Summary, Report No. 2"—M. E. Annich American Brake Shoe Co., Mahwah, N. J.



Program

J. H. Lowe

Max Kuniansky

F. J. Walls

W. H. Ruten

R. Schneidewind

W. E. Sicha

W. H. Johnson

K. M. Smith

D. E. Krause

M. T. Sell

F. S. Brewster

L. W. Eastwood

B. D. Claffey

H. L. Smith

H. W. Dietert

H. H. Wilder

W. K. Bock

R. H. Olmsted

TUESDAY, APRIL 24 (cont'd)

5:30 PM—Registration Closes

7:00 PM—Canadian Dinner

Presiding—J. J. McFadyen, Galt Malleable Iron Co., Galt, Ont. Canada.

8:00 PM (A)—Brass and Bronze Sand Course

(Sponsored by Brass and Bronze Division)

Presiding—J. R. Crain, American Brake Shoe Co., National Bearing Division, Meadville, Pa.

Subject: *"Basic Approach to Sand Control for Copper Base Alloys"—Part II—Hot and Retained Properties."*

Discussion Leader: H. W. Dietert, Harry W. Dietert Co., Detroit.

8:00 PM (B)—Gray Iron Shop Course

(Sponsored by Gray Iron Division)

Presiding—H. H. Wilder, Vanadium Corp. of America, Detroit.

Co-Chairman—E. J. Burke, Hanna Furnace Co., Buffalo.

Subject: *"Melting Gray Iron in a Reverberatory-Type Furnace."*

Discussion Leader: J. G. Winget, Reda Pump Co., Bartlesville, Okla.

8:00 PM (C)—Sand Shop Course

(Sponsored by Sand Division)

Presiding—R. H. Olmsted, Whitehead Bros. Co., New York.

Co-Chairman—E. J. Bush, U. S. Naval Gun Factory, Washington, D. C.

Subject: *"Shell Molding and Use of Resin Binders."*

Discussion Leaders: B. N. Ames, New York Naval Shipyard, Brooklyn, and W. C. Jeffery, Production Foundry, Jackson Industries, Birmingham, Alabama.

WEDNESDAY, APRIL 25

9:00 AM—Registration Opens

10:00 AM (A)—Brass and Bronze Session

(Sponsored by Brass and Bronze Division)

Presiding—F. L. Riddell, H. Kramer & Co., Chicago.

Co-Chairman—A. J. Smith, Michigan State College, E. Lansing.

"Effects of Certain Elements on Grain Size of Cast Copper-Base Alloys"—R. A. Colton and M. Margolis, American Smelting & Refining Co., Barber, N. J.

"Manufacture of Bronze Boiler Drop Plugs"—B. F. Kline and J. R. Davidson, Southern Pacific Railroad Co., Sacramento, Calif.

10:00 AM (B)—Foundry Cost Session

(Sponsored by Foundry Cost Committee)

Presiding—R. L. Lee, Grede Foundries, Inc., Milwaukee.

"'Spec' Sheets and their Various Uses"—John Taylor, Lester B. Knight and Associates, Inc., Chicago.

"A New Method of Evaluating Costs in Jobbing Foundries"—A. W. Schneble, Jr., Advance Foundry Co., Dayton, Ohio, and C. E. McQuiston, Ohio State University, Columbus.

WEDNESDAY, APRIL 25 (cont'd)

10:00 AM (C)—Gray Iron Session

(Sponsored by Gray Iron Division)

Presiding—A. P. Gagnebin, International Nickel Co., New York.

Co-Chairmen—T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa.; W. B. McFerrin, Haynes Stellite Div., Kokomo, Ind.

"Influence of Silicon Content on Mechanical and High-Temperature Properties of Nodular Cast Iron"—W. H. White, Jackson Iron & Steel Co., Jackson, Ohio, L. P. Rice and A. R. Elsea, Battelle Memorial Institute, Columbus.

"Effect of Phosphorus Content on Mechanical Properties of a Nodular Cast Iron"—J. E. Rehder, Dept. of Mines and Technical Surveys, Ottawa, Canada.

"Some Effects of Temperature and Melting Variables on Chemical Composition and Structure of Gray Irons"—E. A. Lange and R. W. Heine, University of Wisconsin, Madison.

10:00 AM (D)—Sand Session

(Sponsored by Sand Division)

Presiding—J. H. Lowe, Wehr Steel Co., Milwaukee.

Co-Chairman—J. A. Rassenfoss, American Steel Foundries, East Chicago, Ind.

"Metal Penetration"—Report, Mold Surface Committee—S. L. Gertsman and A. E. Murton, Dept. of Mines and Technical Surveys, Ottawa, Canada.

"The Determination of Metal Penetration in Sand Molds"—H. A. Gonya and D. C. Ekey, Ohio State University, Columbus.

"Effect of Fluid Metal Pressure and Penetration Defects"—Progress Report—C. C. Sigerfoos, Michigan State College, E. Lansing, Mich.

12:00 Noon (A)—Pattern Round Table Luncheon

(Sponsored by Pattern Division)

12:00 Noon (B)—DEFENSE PRODUCTION LUNCHEON MEETING

Presiding—Walter L. Seelbach, Superior Foundry, Inc., Cleveland.

Speakers: A. J. McDonald, Chief, Castings Section, Iron & Steel Division, NPA, Washington, D.C.; John A. Clausen, Chief, Pig Iron Section, Iron and Steel Division, NPA, Washington D.C.; Lieut. Comdr. William A. Meissner, Bureau of Ships, Washington, D. C. Liaison officer to NPA; Nigel Bell, Director, Light Metals Division, NPA, Washington, D. C.

2:00 PM—ANNUAL BUSINESS MEETING

Presiding—A.F.S. National President W. L. Woody.

President's Annual Address.

Apprentice Contest Awards.

Election of Officers and Directors.

2:45 PM—CHARLES EDGAR HOYT ANNUAL LECTURE

"The Management of Industrial Research"—Zeder, Director of Engineering and Chrysler Corp., Detroit.

4:00 PM (A)—Plant and Plant Equipment Session

(Sponsored by Plant and Plant Equipment Committee)

Presiding—James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.

Co-Chairman—H. W. Johnson, Wells Mfg. Co., Skokie, Ill.

"Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings"—L. N. Schuman, National Malleable & Steel Castings Co., Cleveland.

"Dimensional Checking and Pressure Testing of Gray Iron Castings"—K. M. Smith, Caterpillar Tractor Co., Peoria, Ill.

4:00 PM (B)—Refractories Session

(Sponsored by Refractories Committee)

Presiding—R. H. Stone, Vesuvius Crucible Co., Pittsburgh.

"Ladle Refractories and Practice in Acid Electric Steel Foundry"—Clyde Wyman, Burnside Steel Foundry Co., Chicago.

(General Discussion of ladle refractories and their application)

Program

WEDNESDAY, APRIL 25, (cont'd)

4:00 PM (C)—Sand Session

(Sponsored by Sand Division)

Presiding—E. C. Zirzow, Deere & Co., Moline, Ill.

Co-Chairman—H. K. Salzberg, The Borden Co., Bainbridge, N. Y.

"Some Notes on Core Oil Testing"—A. E. Murton, Dept. of Mines and Technical Surveys, Ottawa, H. H. Fairfield, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont., and B. Richardson, Steel Castings Institute of Canada, Ottawa.

"Recent Advances in Dielectric Core Baking"—J. W. Cable, Thermex Div., Girdler Corp., Louisville, Ky.

H. R. Williams

C. H. Wyman

F. J. Pfarr

R. W. Schroeder

J. R. Goldsmith

A. K. Higgins

B. A. Miller

J. W. Meier

W. B. McFerrin

D. F. Sawtelle

A. P. Gagnebin

R. F. Thomson

R. P. Dunphy

R. A. Flinn

F. P. Strieter

WEDNESDAY, APRIL 25, (cont'd)

5:30 PM—Registration Closes

7:00 PM—A.F.S. Alumni Dinner

(By invitation only)

8:00 PM (A)—Plant and Plant Equipment Session

(Sponsored by Plant and Plant Equipment Committee)

Presiding—James Thomson, Continental Foundry & Machine Co., East Chicago, Ind.

Co-Chairman—K. M. Smith, Caterpillar Tractor Co., Peoria, Ill.

"Choosing Equipment for Nondestructive Testing"—C. H. Hastings, Watertown Arsenal, Mass.

Motion Picture—*"Mechanization in Molding"*—H. C. Weimer, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago.

8:00 PM (B)—Gray Iron Shop Course

(Sponsored by Gray Iron Division)

Presiding—K. H. Priestley, Vassar Electroloy Products, Inc., Vassar, Mich.

Co-Chairman—E. J. Burke, Hanna Furnace Co., Buffalo.

Subject: *"Metal Pouring Temperature Control."*

Discussion Leader: R. A. Clark, Electro Metallurgical Div., Union Carbide & Carbon Co., Detroit.

8:00 PM (C)—Sand Shop Course

(Sponsored by Sand Division)

Presiding—R. H. Jacoby, The Key Co., E. St. Louis, Illinois.

Co-Chairman—H. W. Meyer, General Steel Castings Corp., Granite City, Ill.

Subject: *"Foundry Sand Control"*

Discussion Leader: C. B. Schureman, Baroid Sales Div., National Lead Co., Chicago.

THURSDAY, APRIL 26

9:00 AM—Registration Opens

10:00 AM (A)—Steel Session

(Sponsored by Steel Division)

Presiding—J. A. Rassenfoss, American Steel Foundries, East Chicago, Ind.

Co-Chairman—H. W. Dietert, Harry W. Dietert Co., Detroit.

"Precoat Materials for Investment Casting"—W. F. Davenport and A. Strott, Wright-Patterson Air Field, Dayton, Ohio.

"Contribution of Riser and Casting Edge Effects to Soundness of Cast Steel Plate"—H. F. Bishop, E. T. Myskowski and W. S. Pellini, Naval Research Laboratory, Washington, D. C.

"An Investigation of the Penetration of Steel into Molding Sands"—Official Exchange Paper from Metallografiska Institute—Holger Pettersson, Stockholm, Sweden—To be presented by J. A. Rassenfoss, American Steel Foundries, East Chicago, Indiana.

THURSDAY, APRIL 26, (cont'd)

10:00 AM (B)—Gray Iron Session
(Sponsored by Gray Iron Division)

Presiding—Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.

Co-Chairman—Gosta Vennerholm, Ford Motor Co.

"Basic Cupola Melting and Its Possibilities"—Official Exchange Paper from the Institute of British Foundrymen—E. S. Renshaw, Ford Motor Co., Ltd., Dagenham, England.

"Effect of Slag Analysis on Cupola Operation"—R. A. Flinn, American Brake Shoe Co., Mahwah, N. J.

12:00 Noon—Gray Iron Round Table Luncheon
(Sponsored by Gray Iron Division)

Presiding—A. O. Barczak, Superior Foundry, Inc., Cleveland.

Co-Chairman—C. A. Harmon, Hanna Furnace Co.,

Subject: *Gray Iron Melting with Materials Available."*

Discussion Leaders: J. F. Dobbs, New York Air Brake Co., Watertown, N. Y., and S. A. Kundrat, Homestead Valve Mfg. Co., Coraopolis, Pa.; A. J. McDonald, Chief Castings Section, Iron & Steel Division, NPA, Washington, D. C.

12:00 Noon—Steel Round Table Luncheon
(Sponsored by Steel Division)

Presiding—V. E. Zang, Unitcast Corporation, Toledo, Ohio.

Co-Chairman—D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.

Subjects: *"Alloy Substitutions and Conversion."*
"Increasing Casting and Total Yield."
"Sulphur."
"Acid vs. Basic Practice."

2:00 PM (A)—Gray Iron Session
(Sponsored by Gray Iron Division)

Presiding—V. A. Crosby, Climax Molybdenum Co., Detroit.

Co-Chairman—R. Schneidewind, University of Michigan, Ann Arbor.

"Structure and Mechanical Properties of a Mo-Ni-Cr Cast Iron"—A. E. Loria, formerly with Mellon Institute of Industrial Research, Pittsburgh, presently with The Carborundum Co., Niagara Falls, N. Y.

"Kinetics of Graphitization in Cast Irons"—B. F. Brown and M. F. Hawkes, North Carolina State College of Agriculture and Engineering, of the University of North Carolina, Raleigh.

"Isothermal Transformation Characteristics on Direct Cooling of Alloyed White Iron"—F. B. Rote and G. A. Conger, University of Michigan, Ann Arbor, and K. A. DeLonge, International Nickel Co., Bayonne, N. J.

W. H. Moore

J. W. Cable

W. S. Pellini

A. I. Krynitsky

H. A. Schwartz

V. E. Zang

2:00 PM (B)—Steel Session
(Sponsored by Steel Division)

Presiding—F. Kiper, Ohio Steel Foundry Co., Springfield, Ohio.

Co-Chairman—G. W. Johnson, Vanadium Corp. of America, Chicago.

"Effect of Vanadium on Properties of Cast Chromium-Molybdenum Steels"—N. A. Ziegler, W. L. Meinhart and J. R. Goldsmith, Crane Co., Chicago.

"The Effect of Segregation of Mechanical Properties of Cast Steel,"—John Wallace, Watertown Arsenal, Mass., and H. F. Taylor, Massachusetts Institute of Technology, Cambridge.

"Usefulness and Ill Effects of Gases in Metallurgy"—E. Spire, Canadian Liquid Air Co. Ltd., Montreal, Canada.

4:00 PM (A)—Gray Iron Session
(Sponsored by Gray Iron Division)

Presiding—H. H. Wilder, Vanadium Corp. of America, Detroit.

Co-Chairmen—J. L. Brooks, Muskegon Piston Ring Co., Sparta, Mich., and F. T. McGuire, Deere & Co., Moline, Ill.

"Improvement of Machinability in High-Phosphorus Gray Cast Iron, Part II"—W. W. Austin, Southern Research Institute, Birmingham, Ala.

"Chill Tests and the Metallurgy of Gray Iron"—D. E. Krause, Gray Iron Research Institute, Columbus.

"Silicon-Chromium Alloy in Complicated Iron Castings"—R. A. Clark, Electro Metallurgical Div., Union Carbide & Carbon Co., Detroit.

4:00 PM (B)—Sand Session
(Sponsored by Sand Division)

Presiding—Clyde A. Sanders, American Colloid Co., Chicago.

Co-Chairman—H. W. Dietert, Harry W. Dietert Co., Detroit.

"Silica Sands—Sieve Analyses"—A. I. Krynitsky and F. W. Raring, National Bureau of Standards, Washington, D. C.

"Testing of Sand Under Impact"—W. H. Moore, Meehanite Corp., Cleveland Hts., Ohio.

7:00 PM—ANNUAL BANQUET

Presiding—Walton L. Woody, President, A.F.S.

PRESENTATION OF A.F.S. GOLD MEDAL AWARDS AND HONORARY LIFE MEMBERSHIPS.

Speaker: Dr. Kenneth McFarland, Superintendent of Schools, Topeka, Kansas—*"Which Knew Not Joseph."*

PAPERS CONTINUE TECHNOLOGY EXCHANGE BETWEEN A.F.S., OVERSEAS FOUNDRY GROUPS

Outstanding technical papers exchanged between the American Foundrymen's Society and foundry organizations in other parts of the world highlight annual conventions here and abroad and keep foundrymen everywhere up to date in foundry techniques. Exchange arrangement of longest standing is that with the Institute of British Foundrymen which has continued each year since 1922. Author of this year's paper from IBF is E. S. Renshaw, head foundry metallurgist, Ford Motor Co., Ltd., Dagenham, England. Director of extensive work in the use of the basic-lined cupola, Mr. Renshaw will present a paper entitled

Exchange paper from A.F.S. to the Association Technique de Fonderie is by Henry W. Zimnawoda, National Engineering Co., Chicago. Entitled *"Mechanical Equipment for the Medium-Size Gray Iron Foundry,"* the paper will be presented at the French Foundry Technical Association's annual meeting in Paris, June 4-6. The entire paper, extensively illustrated, will be published in AMERICAN FOUNDRYMAN and in this year's TRANSACTIONS.

R. Dyke, Defence Research Laboratories, Maribyrnong, Victoria, is author of this year's exchange paper from the Institute of Australian Foundrymen. The

V. Paschkis

EXCHANGE PAPER AUTHORS

H. Zimnawoda

R. Dyke

"Basic Cupola Melting and Its Possibilities" at a gray iron session, Thursday, April 26, 10:00 a.m., during the A.F.S. Convention in Buffalo, N.Y., April 23-26.

Mr. Renshaw will describe the use of a basic-lined cupola as part of a product unit, slag conditions which favor desulphurization to low limits and also give high carbon pickup, and the possibility of taking advantage of these factors in nodular iron production.

The A.F.S. exchange paper to the Institute of British Foundrymen is *"Some Thermal Considerations for Foundrywork"* by Victor Paschkis, Columbia University, who conducts A.F.S.-sponsored heat transfer research by means of a heat and mass flow analyzer in which electrical circuits substitute for heat flow channels. Dr. Paschkis' paper will be presented during the IBF Annual Meeting at Newcastle-on-Tyne, June 12-15. An excerpt from the paper, showing the many foundry situations in which transfer of heat is involved will appear in AMERICAN FOUNDRYMAN later this year and the entire paper will be published in A.F.S. TRANSACTIONS for 1951.

paper, *"The Modification Technique of Aluminum-Silicon Alloys,"* will be presented at an aluminum and magnesium session on Monday, April 23, 4:00 p.m.

Mr. Dyke covers: minimum amount of sodium for modification and effect of cooling rate on this minimum; rate of loss of sodium; relative efficiencies of metal and salt methods of modification; the effect of sodium content on gas pickup and gas porosity; and modification of normal degassing techniques.

"An Investigation of the Penetration of Steel into Molding Sands," by Holger Pettersson of the Metallografiska Institute, Stockholm, Sweden, is scheduled for a Thursday morning steel session, April 26, 10:00 a.m. The paper describes work based on immersion of cylindrical sand cores in molten carbon steel and a comparison with penetration of standard castings. Certain contradictory results are reported and it is shown how rate of penetration varies with time of immersion, metal pressure, temperature and analysis of steel, grain size of the sand, various additions to the sand, and other factors.

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Cleveland, Ohio

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AFS HOSTS *Continued . . .*

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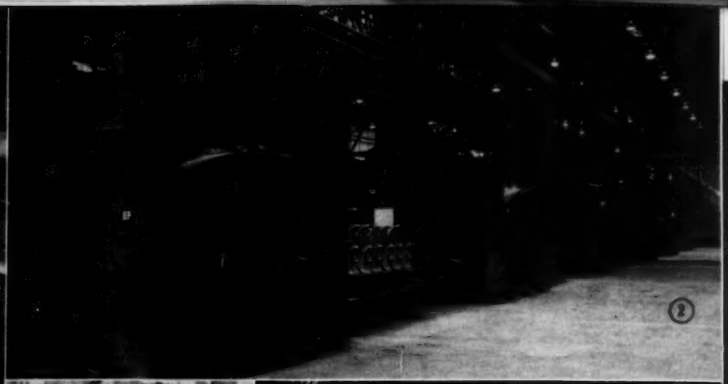

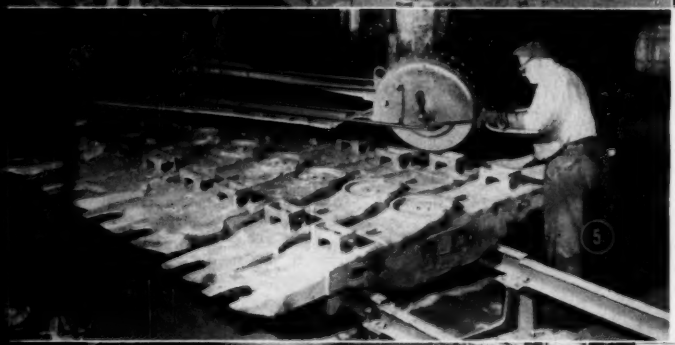

PLANT VISITATION HIGHLIGHTS

(1) Foundry students at work at New York State Institute of Applied Sciences. (2) Battery of heat-treating furnaces at Pratt & Letchworth Co. (3) Pouring from cupola to mixing ladle at American Radiator & Standard Sanitary Corp. (4) Pouring large casting at Worthington Pump & Machinery Corp. (5) Swing frame grinder working on railroad truck bolsters at Symington-Gould Corp., Depew, N. Y. (6) Pouring room at Buflovak Division, Blaw-Knox Co. (7) Finishing large-diameter grinding wheel at the Carborundum Company, Niagara Falls, N. Y.

BUFFALO, where Great Lakes ore boats and trains from the Pennsylvania coal fields meet to form one of the nation's most productive foundry and metals fabricating centers, will have the welcome mat out for 55th A.F.S. Convention visitors who wish to see the castings industry in operation.

Open for inspection by visiting foundrymen will be such varied foundry operations as the casting of steel railroad equipment, gray iron castings, all types of non-ferrous casting, malleable iron casting, smelting and refining of aluminum and bronze and pig iron and production of wood and metal patterns for the foundry industry.

Visitors to the 55th A.F.S. Foundry Congress desiring to visit plants and other foundry operations described on this page are requested to register at the Plant Visitation Booth, to be located in Convention Headquarters. Foundry experts from the Buffalo area, members of the A.F.S. Western New York Chapter, hosts to the Convention, will be on hand to offer guidance and further details on visitations to plants in the Buffalo area.

PLANT VISITATIONS

55th A.F.S. FOUNDRY CONGRESS

Buffalo — **April 23-26**

New York State Institute of Applied Arts & Sciences, 1685 Elmwood Ave.
Shop courses in foundry practice—Otto Guenther. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m. April 23-26.

Pratt & Letchworth Co., Inc., 189 Tonawanda St.
Highly mechanized steel foundry, producing a variety of railroad and miscellaneous steel castings. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m. April 23-26.

Symington Gould Corp., Depew, N. Y.
Production open hearth steel foundry, producing railroad side frames, bolsters, couplers etc. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m. April 23-26.

Atlas Steel Casting Co., 1963 Elmwood Ave.
Producers of commercial electric steel castings. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m. April 23-26.

Tonawanda Electric Steel Casting Corp., 5 Mechanic St., North Tonawanda, N. Y.
Small jobbing shop. Loose pattern molding. Open 10:00 a.m. - 12:00 noon. April 23-26.

Rohlman Foundry Co., Inc., 205 Baitz Ave.
Large and medium meehanite castings. Open 10:00 a.m. - 12:00 noon. April 23-26.

American Radiator & Standard Sanitary Corp., 25 Rano St.
One of the most up-to-date foundries producing cast iron boilers. Open 8:45 a.m. - 10:15 a.m., 11:15 a.m. - 12:15 p.m. April 24 and 26.

Casting Co., 575 Howard St.
Foundry produces light and medium electric furnace gray iron castings. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m., April 23-26.

Novak Equipment Div., Blaw-Knox Co., 1543 Fillmore Ave.
Foundry produces large gray iron and semi steel-castings. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m., April 23-26.

Worthington Pump & Machinery Corp., Clinton & Roberts Sts.
Complete facilities for producing all types of engine castings. Open 10:00 - 12:00 noon, 2:00 - 4:00 p.m., April 23-26.

Lakeside Bronze Inc., 90 Arthur St.
Small and medium nonferrous castings. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m., April 23-26.

Frontier Bronze Co., Inc., Packard Rd., Niagara Falls, N. Y.
Producers of Brass, Bronze, Aluminum, Monel and 40 F Alloy castings. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m., April 23-26.

Samuel Greenfield Co., Inc., 31 Stone St.
Smelters and refiners of aluminum and bronze. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m., April 23-26.

Kencroft Malleable Co., Inc., 373 Hertel Ave.
Foundry produces miscellaneous malleable iron castings. Open 10:00 a.m. - 12:00 noon., April 24 and 26.

The Carborundum Co., Niagara Falls, N. Y.
Open April 24 and 25. Contact G. S. Eisaman at the convention or call C. H. Demmin at Niagara Falls, Tel. 6631.

Tonawanda Iron Div., American Radiator & Standard Sanitary Corp., River Rd., North Tonawanda, N. Y.
Producers of foundry grades of pig iron. Open 10:00 a.m. - 12:00 noon, 2:00 - 4:00 p.m., April 23-26.

Standard Pattern Co., 104 Oliver St., North Tonawanda, N. Y.
Wood and metal patterns for production. Open 10:00 a.m. - 12:00 noon., April 23-26.

CHAIRMAN
Mrs. John R. Wark

CO-CHAIRMAN
Mrs. Alfred A. Diebold

Entertainment

IGHTSEEING will make up the four-day enter-
for ladies of the 55th A.F.S. Convention. Run-
dly with four days of technical sessions that comprise
tion, the Ladies' Entertainment Program will feature
on and tea, a luncheon and antique jewelry exhibit, a
eing tour and luncheon at Niagara Falls and optional attend-
at the Annual Banquet, top social event of the foundry season.

Opening the four-day program will be the annual A.F.S. Reception and Tea for ladies of the Convention, from 3:00 to 5:00 p.m., Monday, April 23. Tuesday's program will feature luncheon at Buffalo's Twentieth Century Club, with a display of antique jewelry of all nations and a talk by Sabine Heritage, world-renowned jewelry collector.

All day Wednesday, April 25, will be devoted to a bus tour of Niagara Falls. Chartered buses will leave the Hotel Statler at 10:00 a.m. and will enter Canada at Fort Erie via the International Peace Bridge. Following the Canadian side of the Niagara River to Niagara Falls, they will cover such points of interest as the Upper Rapids, Horseshoe Falls, Lower Gorge and Whirlpool Rapids, stopping at the historic General Brock Hotel, where luncheon will be served in the dining room overlooking the Falls.

After luncheon, the group will cross the Rainbow Bridge to the American side, visit Goat Island, which separates the American and Horseshoe Falls, then return to downtown Buffalo by way of Grand Island.

Climaxing four pleasure-packed days of entertainment will be the Annual Banquet of the American Foundrymen's Society the evening of Thursday, April 26, when foundrymen and their ladies meet for the foundry world's highlight annual social event. Featured on the Banquet program are presentation of A.F.S. Gold Medals and Honorary Life Memberships to the nation's outstanding foundrymen, and a talk by Dr. Kenneth McFarland of Topeka, Kansas, nationally-known dinner speaker.

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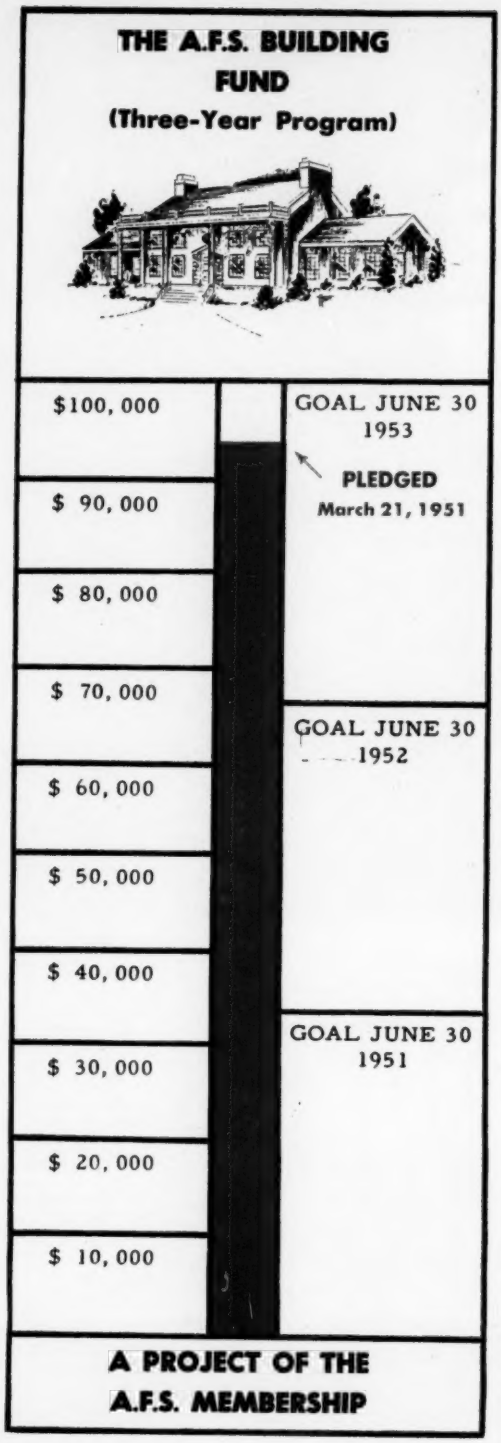

BUILDING FUND ROARING DOWN HOME STRETCH

NEARING THE FINISH LINE—a three-year goal of $100,000—after covering the course in less than a year from its inception, the A.F.S. Permanent Headquarters Building is today a reality, with $95,000 already attained and contributions pouring in daily. Meteoric success of the Fund raising is due to the overwhelming support accorded by Society members, who have contributed individually or through their Chapters, and by contributions from foundries, foundry equipment manufacturers and supply firms. Individuals, A.F.S. Chapters and firms still desiring to contribute to the Society's Permanent Home are requested to send contributions to the American Foundrymen's Society, 616 S. Michigan, Chicago 5.

Remember—only 14 days to become a Charter Subscriber to the future of your Society and industry!

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(Continued on Page 169)

DIE CASTING MAGNESIUM ALLOYS

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Vice President
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MAGNESIUM is the baby of the die casting materials in this country. Not until 1931 did Charles Pack first die cast magnesium in his vertical cold chamber machine. Despite this good beginning no progress was made until 1935, when the horizontal cold chamber machine came into use. In the interim, considerable experimentation served to demonstrate that the air-gooseneck machine was unsafe and incapable of producing quality magnesium castings. Steady progress has been made since 1935.

In Germany the start was earlier, in 1925, again with the air machine. By 1932, however, the Germans were producing a considerable tonnage of magnesium die castings, largely with aid of the Polak cold chamber machine. The trend then reversed, and by the start of World War II the Germans were producing a large proportion of their magnesium die castings on hot chamber machines, both piston and air types. The hot chamber machine has not been commercially reverted to in this country although we may see it before long. Considerable research is being carried on in this direction. The hot chamber machine has a strong incentive in its high casting speed, as well as in the complexity of the castings it can produce.

Special Methods Required

The physical and chemical characteristics of magnesium differ somewhat from those of other metals, and special methods are required for casting and finishing. Magnesium tends to oxidize quite readily at higher temperatures (1000 F). It may also be oxidized by sulphur. This tendency to oxidize makes it necessary to melt magnesium under a protective flux blanket of sulphur dioxide.

An interesting paradox exists with respect to sulphur. Briefly, sulphur dioxide inhibits burning until burning starts. Then it feeds the burning because of magnesium reaction with both the sulphur and the oxygen of the decomposed sulphur dioxide. This peculiarity is the cause of some of the fires occurring in handling magnesium. Water and sand are also dissociated by burning magnesium with resulting violent reactions, and are not suitable as fire extinguishers.

The metal is tarnished quite readily by moist and salty atmospheres. Its oxide coating (unlike that on aluminum) is not a sealer, and therefore cannot protect the appearance of castings subjected to exposure.

Melting and Refining: Because of its tendency to burn when molten, magnesium requires special and experienced handling in melting and refining. The casting pot is protected by sulphur dioxide by means of a special, self-generating hood over the pot. The casting scrap (sprues, dripping and flash) cannot be properly cleansed in the casting pot, and must be returned to an open refining pot where a flux is used to clean and protect the melt. From there it may be transferred in the molten state to the casting pot or re-pigged.

The casting pot must be fluxed out periodically. This fluxing operation is carried out with considerable care to ensure that no flux remains to contaminate the castings. It is very important to keep the casting pot free from dross accumulations at the metal line. Such accumulations seem to promote burning of the metal.

Minor alloy additions must be made to the remelted die cast scrap to maintain the proper composition. The most commonly used alloy, AZ91 (R), is not susceptible to alloy contamination in the manner of zinc-base alloys. Nickel and copper are the detrimental contaminants because they increase the corrosion rate of the metal when exposed to salty atmospheres. Excess zinc in the alloy serves only to increase its already strong tendency toward hot cracking. Aluminum above the composition limits makes the metal hard and brittle.

Magnesium die castings have many critical applications, especially in aircraft engines and accessories.[9]

Fumes from the melting fluxes are very corrosive toward buildings and castings. An unprotected metal building can be completely eaten away in several year's time. Special precautions should be taken in the construction of a building to be used for magnesium melting. Any steel work must be well protected with acid-resisting paints. Castings must be protected during storage and processing. In the author's plant, the magnesium castings are removed from the casting department promptly, and then each box is covered with a canvas.

Die Casting Technique: Unquestionably, magnesium presents more difficulties than any of the alloys commonly used in die casting. Fortunately, the magnesium die caster has to contend with only one prac-

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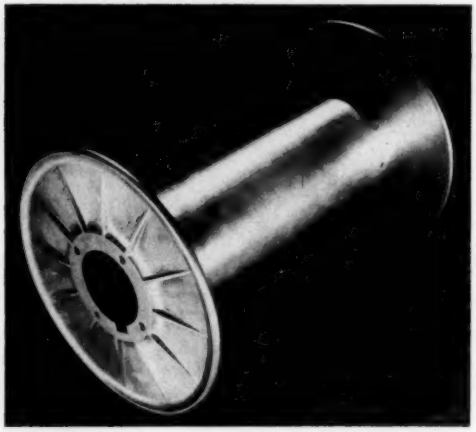
tical alloy. This difficulty in casting stems from two characteristics of the alloy: its low heat content at the pouring temperature, and its wide freezing range, the latter being the cause of hot cracking.[8] When cast from the same pouring temperature, magnesium must give up only about half as much heat as does aluminum before being removed from the die. This means that magnesium will not flow as far or into as thin a section as would aluminum. On the other hand, it means that magnesium can be removed from the die with less delay, thereby greatly speeding the casting cycle.

In a given die, magnesium can be cast 20 to 30 per cent faster than aluminum. On the other hand, the casting efficiency of magnesium is definitely lower. For example, a job which produces 8 to 10 per cent



This textile warp beam or spool has 13-in. diameter magnesium die cast flanges, joined by central tubing.

scrap in aluminum may run 15 to 20 per cent in magnesium, which offsets some of the casting speed advantage of magnesium.

Gating for magnesium is not too different from that for aluminum. The major difference, in the author's experience, is in the aspect ratio of the gate. The broad, thin gate so often seen on aluminum die castings is not often used for magnesium. The area of the gate will depend on the method of filling desired. The great majority of castings are made with a small "spray" gate. Venting must be more carefully thought out and more generous, in view of the faster injection normally used with magnesium.

Extremely high pressures are sometimes used when exceptional soundness is required. These high pressures are used only when absolutely necessary in view of the detrimental effect on dies and the accompanying difficulty of casting injection. While on the subject of high pressures, it might be well to point out that special means of attaining those high pressures should be very carefully studied before purchasing equipment for die casting magnesium.

Much money and energy have been wasted in trying to produce aircraft quality magnesium die castings with such devices as pre-fill injection. Injection multipliers may have the same drawbacks unless they have the capacity of getting the metal into the die fast and hard without a letdown or hesitation at the end of the stroke. The greatest success has been achieved with a large accumulator on a fairly large cylinder plus generous valving and piping to put the metal in hard and fast.

Magnesium places more of a demand on die casting equipment than any other metal. Most important, the machine must be flexible, i.e., have a wide range of plunger speed and pressure. Cooling of the dies is much less of a problem with magnesium than with aluminum. This is one reason why dies tend to last longer with magnesium. In some cases it is figuratively necessary to horsewhip the operators to get them to cast fast enough to keep the dies at the optimum operating temperature. Dies must be sturdy to withstand the terrific mechanical shock. By the same token, the die clamping must be more powerful to hold the dies together, which means a larger machine.

Magnesium is prone to give more trouble with surface imperfections than other metals. These imperfections consist of cracks, misruns, shrinks, swirls (turbulence marks) and oxidation. The last mentioned is the roughness resulting from oxide buildup on hot spots of the die. It can sometimes be combated by selective water cooling in the die, but more often can be eliminated only by changing the design of the casting. One automotive casting produced in the author's plant had to be converted to aluminum because oxidation prevented a smooth paint job.

Cores Easily Removed

Little difficulty of this sort has been experienced in aluminum so long as water lines are kept clear. On the other hand, little difficulty is experienced with magnesium galling on cores where draft is inadequate, nor does die washing result with magnesium. Fundamentally, magnesium is a slippery metal. Cores have been pulled 2½ in. deep with no draft and no tendency to scuff. Long, thin cores give less trouble in aluminum because of the reduced mechanical shock.

Trimming: Die trimming of magnesium die castings is done in much the same manner as with aluminum or zinc. Less shaving action on the trim dies is required. In fact, a chamfer on the cutting edge is often used to give a smooth or burnished job. Trim dies are seldom hardened as is necessary in aluminum trimming. Also, it is never necessary to oil the castings or trim dies to prevent scuffing.

If grinding or buffing are to be done, special precautions must be observed in collecting and disposing of the grinding dust. The author prefers individual and portable water-wash collectors for each grinder. Any type of collector must be properly maintained and regularly cleaned to guard against serious explosions. Magnesium dust mixed with 5 to 30 per cent water makes a very potent explosive. Only a spark is required to set it off.

In six years of experience with individual collectors this plant has never had a magnesium fire that

resulted in a lost-time personal injury or property loss. To prevent hydrogen and magnesium dust explosions any collector must be kept clean and well ventilated. The sludge should be burned on a dump.

Drilling, tapping, turning and milling may be done dry without the need of dust collectors. In these operations it is important to maintain sharp tools and to prevent the accumulation of chips so that any fire will be a minor one. Trimming flash is returned to the melting room for reclamation. Chips and grindings are not economically recoverable and are usually burned on the dump. If large quantities of coarse chips are produced they may be sold to a smelter, which is better equipped to obtain economical recovery. The little machining necessary on magnesium die castings will demonstrate its excellent machineability. Tool life is much greater than with aluminum.

Finishing: After trimming, one of two treatments is given the castings, depending on their use. They may be either chrome-pickled or oiled. This is necessary to forestall undue corrosion of the castings during subsequent shipment and storage. The oil dip actually provides the best protection, but sometimes is objectionable with respect to finishing operations.

The pickle provides a good base for commercial painting operations. For aircraft work the castings are given (by the painter) an alkaline dichromate boil, followed by the usual zinc chromate primers, etc. Anodizing is possible but is not often used because of its cost. Plating of die castings has lagged behind the development for other magnesium forms.

Applications: The light weight of magnesium, two-thirds that of aluminum, is its main selling point. Notable exceptions to this are in textile bobbins and lawn-mower gears. In the former, aluminum is undesirable because it tends to smudge and mark light colored yarns. In the latter, the wear resistance of magnesium is just as good as that of aluminum but, due to the current high price of secondary aluminum, magnesium is at present the most economical material. However, the current shortage of primary and secondary magnesium alloy may soon push this job into aluminum. Other applications are optical instruments (cameras-binoculars), portable business machines, portable tools, aircraft parts, and auto parts.

Relative Cost Factors Govern

The cost of the castings is a large factor in their salability in competition with aluminum or zinc. Roughly speaking (with normal metal prices), if an aluminum die casting weighs ½ lb or over, magnesium may be competitive. The same would be true in the case of a zinc casting weighing over 1 lb. Several years ago, when aluminum and zinc ingot prices were high and magnesium was normal, it was found that most of the usual arguments against magnesium fell into insignificance because of the cost savings that could be offered. The fact that magnesium parts must often be painted where an aluminum or zinc part could exist without protection is a definite deterrent to their use.

The foregoing discussion boils down to this—there is a best use for each of the die casting alloys. Their continued advancement can be brought about only by careful application engineering. Each of the alloys, magnesium, brass, aluminum and zinc, must take its place alongside the others and stand or fall on its own merits.

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Aluminum and Magnesium Research Committee Reviews Year's Progress

MEETING FEBRUARY 26 at A.F.S. Headquarters, Chicago, members of the A.F.S. Aluminum and Magnesium Division's Research Committee reviewed research progress during the past year and proposed several new projects to be undertaken by the Committee.

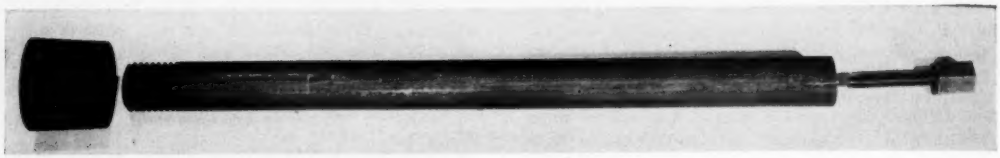
Among the proposed researches to be undertaken is an investigation of the possibilities of adapting findings of the Aluminum & Magnesium Research project to the gating of test bar molds. The information obtained from this proposal, which was unanimously approved, will be made available to various government agencies for possible incorporation in federal specifications.

A report by L. W. Eastwood on the status of the Aluminum & Magnesium Research Project at Battelle Memorial Institute told of preparation of nine patterns for 8 x 10 in. plates, each having different gating designs, and all to be poured from the same melt. Also reported by Dr. Eastwood was construction of a model for the study of runners of various dimensions.

Twelve runner dimensions can be used in the model with or without an enlargement under the sprue. Liquid may flow in both directions from the sprue in a two-runner system or in one direction from the sprue in a one-runner system, providing for a total of 144 different sets of geometry.

Degree of aspiration, length of time to wash the air bubble from the base of the sprue and capacity of the system were measured in each instance. Twenty-five of the conditions that did not aspirate required a long cleanup time to remove the air pocket from the base of the sprue, and of the 25, 11 proved to be superior.

Attending the meeting were Chairman R. F. Thomson, General Motors Research Laboratories; Walter Bonsack, Christiansen Corp.; W. J. Klayer, Aluminum Industries, Inc.; W. E. Sicha, Aluminum Co. of America; Theodore D. Stay, Reynolds Metals Co.; L. W. Eastwood, Battelle Memorial Institute; and A.F.S. Technical Director S. C. Massari.



DEGAS MOLTEN METALS WITH INERT GAS

Fig. 1—This type of radial-drilled graphite degassing tube is adapted to most nitrogen flushing operations. It is fitted with a threaded graphite plug and a stainless steel adaptor.

E. F. Kurzinski
Development Engineer
The Linde Air Products Co.
New York

INVESTIGATIONS conducted by the author's company, both in the laboratory and in customers' plants, have proved that flushing molten metals with high-purity nitrogen removes porosity and aids in the production of sound castings. Since earlier work* was reported many improvements have been developed, especially in equipment and ease of application.

Porosity can be avoided if extraordinary precautions are taken in the selection of the charge, charge preparation, melting practices, and post-melting practices. But such close control is inconvenient, expensive, and altogether unsuitable for production requirements. Consequently there are occasions when every foundry experiences porosity due to dissolved gas. Nitrogen flushing is an extremely economical way to eliminate this source of casting defects.

The dissolved gases which cause porosity in cast metals are hydrogen, sulphur dioxide, carbon monoxide, carbon dioxide, and oxygen. These gases are soluble in the molten metal, and the quantity in solution increases with increasing temperatures. Therefore, as the metal cools in the mold, a temperature is soon reached where the quantity of dissolved gas is in excess of that which can remain in solution at the temperature, and a quantity of dissolved gas is precipitated out as a bubble to effect equilibrium. This continues until solidification is reached. To assure sound castings, it is necessary that the quantity of dissolved gas be reduced to at least that which is in equilibrium at the solidification temperature or preferably to a lower level.

Measure Quality Improvement

The removal of the dissolved gases in molten metals by nitrogen flushing is purely physical. The nitrogen bubble, upon release below the metal surface, passes up through the bath and the dissolved gases diffuse through the metal-gas interface. The diffusion, in theory, continues until the partial pressure of the dissolved gas in the bubble is in equilibrium with the metal bath. In practice, this ideal condition is not attained because of the relatively small depth of metal being treated. By introducing a multiplicity of nitrogen bubbles, each removes a portion of the dissolved gases and soon a minimum value is achieved.

The improvement in metal quality as a result of nitrogen flushing is not of a similar degree in all foundries. The improvement can be measured by observing the increase in tensile strength, yield strength, per cent elongation, fracture test, or by microstudy. The average increase in tensile strength reported by foundries using nitrogen flushing ranges from about 5 to 26 per cent. The lowest increase, percentage-wise, results in those foundries operating under the most favorable conditions, whereas the greatest improvement results in foundries operating under adverse conditions or producing particularly critical castings.

Good Practice Necessary

It must be realized that nitrogen flushing can not make "best" metal better in quality nor can flushing correct for porosity caused by excessively damp sand, hard ramming, poor gating, or inadequate venting. However, by utilizing an accepted practice followed by nitrogen flushing, superior castings are definitely obtained.

Eliminating porosity, and thus improving the physical properties of castings, is not the only advantage of nitrogen flushing or degassing. The process also brings about a more uniform metal temperature and the thorough mixing of alloy additions to the molten metal. To illustrate the improvement in metal uniformity, one foundry reported that the phosphorus

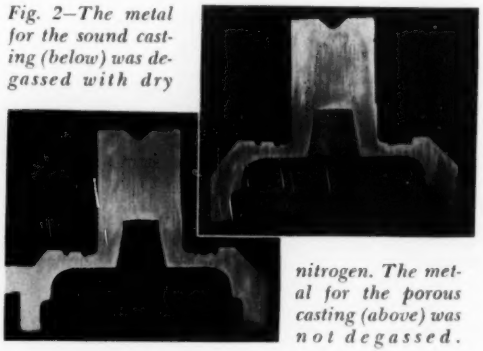


Fig. 2—The metal for the sound casting (below) was degassed with dry nitrogen. The metal for the porous casting (above) was not degassed.

*E. Kurzinski, "Degassing Non-Ferrous Metals," *The Foundry*, Dec. 1948, p. 72, and Jan. 1949, p. 88.

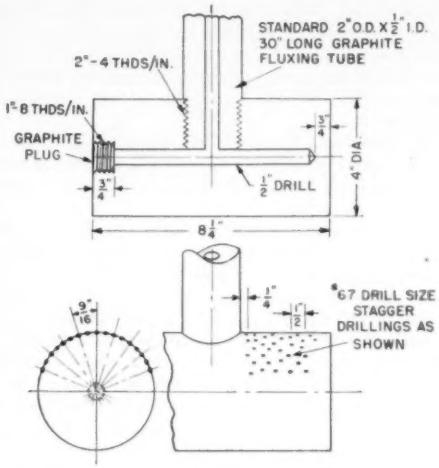
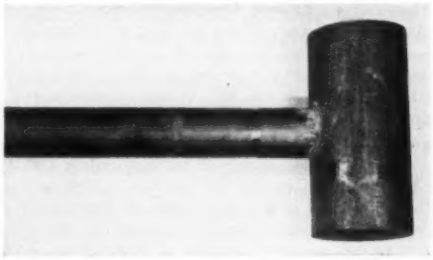


Fig. 3—Cutaway drawing and photograph of a graphite tube which is suitable for degassing large quantities of metal in furnace or ladle when high nitrogen flow rates are necessary.



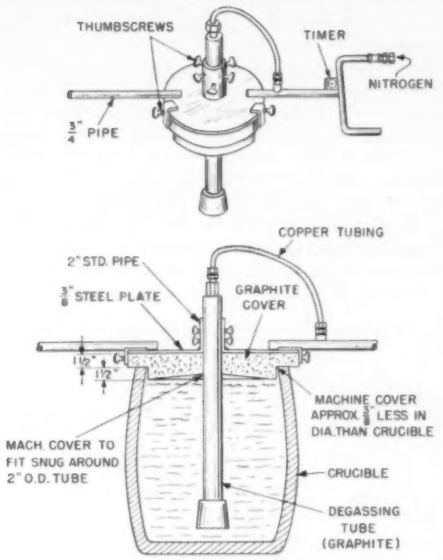


Fig. 4—Construction drawing (above) of a nitrogen flushing unit used for a crucible. The degassing assembly is placed over the filled crucible with nitrogen flowing, its weight holding it in position during treatment. The photograph (below) shows the nitrogen being applied (approx. 30 cu ft/hr), the operator standing back to escape the heat thrown off by the crucible.

variation in castings poured from 550-lb ladles of copper averaged from 0.019-0.020 per cent following nitrogen degassing, whereas the variation ranged from 0.016-0.025 per cent without nitrogen. The results of nitrogen flushing can be seen in the castings in Fig. 2. The casting on the right has been degassed, while no degassing was used in making the casting at left.

Degassing Tubes: Most nitrogen flushing applications are possible with the radial-drilled tube shown in Fig. 1. The tube, made of graphite, is resistant to erosion and thermal shock. In production installations, radial-drilled tubes have withstood over 200 immersions before needing replacement. In other instances the radial-drilled tubes have remained immersed for several 60-min periods in molten bronze with the heating flames on and have shown no visible erosion. This tube is fabricated from a standard 2-in. OD, ½-in. ID graphite fluxing tube onto which a radial-drilled graphite plug is threaded.

When treating molten metals in uncovered crucibles a porous graphite tube is used. This tube permits higher nitrogen flow rates without causing metal splashing. The porous graphite tube is similar in

construction to the radial-drilled tube except that the gas is diffused through a porous graphite rather than through drilled openings.

The degassing tube shown in Fig. 3 is suitable for degassing large quantities of molten metal in the furnace or the ladle when high nitrogen flow rates are necessary to complete the degassing job in a reasonable period of time. The stainless steel adaptor, shown in Fig. 1, makes it easy to change tubes. It is designed to cut its own threads as it is forced into the ½-in. hole in the standard graphite fluxing tube.

Degassing Small Quantities of Metal: A large percentage of jobbing and production foundries use crucibles for melting or pouring. If the metal is melted in a

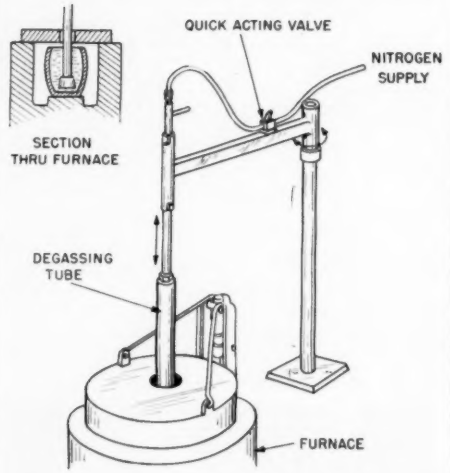


Fig. 5—This degassing unit is designed for introducing nitrogen into a furnace during melting. The nitrogen can be applied with the flames on or off, and without loss of production time.

tilting furnace using No. 300 or No. 400 lip-type crucibles it is generally poured into smaller crucibles when transferred to the mold floor. Usually the minimum quantity of nitrogen needed for flushing varies from 8 cu ft per ton for copper-base alloys to 25 cu ft per ton for aluminum-base alloys. These gas quantities will produce sound castings under all conditions. However, the figures given are for severely gassed metals, and in many cases the quantities may be reduced somewhat.

The best method for flushing molten metal in a crucible and the construction of the degassing unit are shown in Fig. 4. The metal should be heated in the furnace to approximately 100 F above the desired pouring temperature. The metal is then placed in a crucible and conveyed to the slag or skimming pile. The slag is removed and the deoxidizer added, if required.

The nitrogen flow is adjusted to approximately 30 cu ft per hour and the degassing assembly positioned over the crucible with the timer set for the required treating time. When the bell in the mechanical timer rings, the degassing assembly is removed and the nitrogen flow stopped. When the degassing unit is not in use it should be stored in a suitable rack, preferably an old crucible, so that oxidation of the graphite is retarded.

While the graphite tube will last for more than 200 immersions if reasonable care is exercised, the graphite cover will last considerably longer. Usually it breaks before it wears out.

The production of gas-free metal and elimination of the possibility of reoxidation are the advantages of using a cover with a degassing assembly. The cover also permits higher nitrogen flow rates. This results in agitation which assures uniformity of alloying agents as well as a uniform pouring temperature throughout the metal. Since the metal is agitated under a nitrogen atmosphere, the nitrogen reduces the quantity of dissolved gases in the metal more efficiently when a cover is used. Foundrymen report that this provides a cleaner crucible and decreases the amount of skulling.

When using this method the crucible should be filled to a point approximately 2 in. below the top level to prevent spillage. This is usually standard procedure because pouring is hazardous and more difficult with the metal above this level.

Reduce Treatment Time

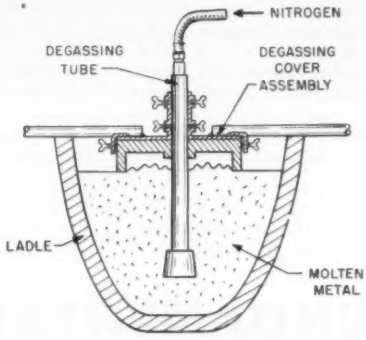
When a graphite cover is used, treatment time is much less than when a porous graphite tube without a cover is used. For example, treating time for 200 lb of bronze (No. 70 crucible) is approximately 4½ min without the cover, while the time with the covered assembly is only one minute.

Some foundries introduce nitrogen while the metal is being melted in the furnace, as shown in Fig. 5. The advantages of this procedure are that the time for melting is decreased and no production time is lost because the required amount of flushing gas is introduced by the time the pouring temperature is attained. The main disadvantages are that tube erosion is more severe and additional porosity-forming gases can be introduced during subsequent handling.

Treating Large Quantities of Metal: The equipment required for degassing large quantities of metal varies from that shown in Fig. 6 to standard 2-in. OD x ½-in. ID graphite fluxing tubes or steel pipe plugged and drilled with many holes at the lower end. The advantage of the equipment shown in Fig. 6 is that high nitrogen flow rates can be introduced with no visible splashing and the metal is "boiled" in a nitrogen atmosphere, eliminating further gas pickup.

The mallet-type degassing tube has also been successfully used in combination with the graphite cover to effect greater dispersion of the nitrogen. With this equipment 1,000-lb ladles of copper-base alloy have been degassed in 2 min with 8 cu ft of nitrogen per ton of alloy. In one brass foundry 20-ton ladles of copper-base alloy are being degassed with high-purity nitrogen introduced through graphite tubes plugged at one end and pierced with many radial-drilled holes in a 2-ft section above the closed end.

Continuous Introduction of Inert Gases: Heats of aluminum-base and copper-base alloys were success-



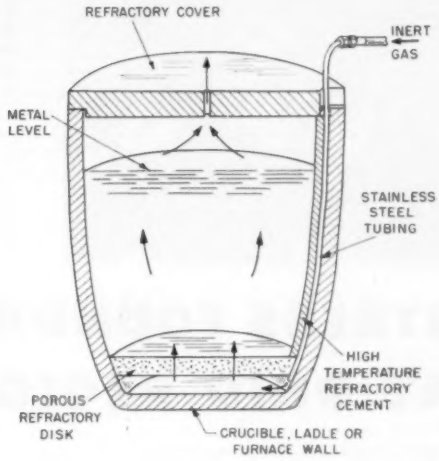


Fig. 6 (above)—Large quantities of metal may be nitrogen degassed with this unit. Fig. 7 (right)—Aluminum- and copper-base alloys can be degassed by continuous introduction of nitrogen through porous refractory disk in crucible bottom.

fully degassed by continuously introducing nitrogen gas through a porous refractory disk cemented into the bottom of the crucible, as shown in Fig. 7. The crucible was covered with another refractory disk to maintain a positive nitrogen pressure over the molten metal. The nitrogen gas was introduced at a slow rate all during the meltdown and until the desired pouring temperature was reached.

Initial experiments were made utilizing porous graphite disks but these were not too satisfactory, because of excessive abrasive wear caused by the loading of the charge. Refractories of the mullite, aluminum oxide, or silicon carbide type are more suitable. A high aluminum, high temperature insulating brick is desirable, since the material is abrasion-resistant and sufficiently porous to pass considerably more than the required amount of flushing gas. Therefore, the pressure below the porous material need only be slightly in excess of the head of metal.

The rate of introduction should be maintained as low as possible, usually not greater than 20 cfh. As soon as the desired pouring temperature is reached, the metal should be poured into the pouring ladle or molds with the minimum amount of stirring or other agitation. The nitrogen flow is continued until all the metal is poured.

Treating Other Metals

The advantage of this type of inert gas introduction is that metal comparable in quality to that melted in a vacuum furnace is obtained, since the metal is maintained under an inert atmosphere at all times. The rate of dissolved gas elimination is further increased because the introduction of the inert gas in the form of small bubbles below the metal surface results in a metal-atmosphere diffusion surface approaching infinity. This method of inert gas introduction is especially suited to metals melted in an induction furnace.

Steel: Refractory tubes are not satisfactory for introducing a flushing gas into molten stainless steels. The best practice still is to use a steel pipe and introduce the flushing gas while continuously feeding the pipe as it is melted off. The rate of pipe consumption can be appreciably reduced by coating it with furnace slag or refractory cement, or by encasing the pipe in high-temperature ceramic sleeves.

Although tests have indicated a slight increase in dissolved gas content as the metal is transferred from the arc furnace, to the bull ladle, to the pouring ladle, furnace treating usually results in sound castings.

Flushing molten stainless steel, usually done with argon, does not aid in reducing shrinkage porosity, controlling oxidation-reduction reactions, nor counteracting poor foundry practice. The flushing gas must be introduced into fully killed steels. The foundries using argon, however, report an elimination in porosity-forming gases, removal of non-metallic inclusions, and a better mixing of alloying agents. Introduction of argon into the electric furnace heats in the quantity of 6 cu ft per ton resulted in the hydrogen content of 18-8 type stainless steel being reduced on the average from 0.0008 to 0.00049 per cent.

Zinc: During the past year preliminary work, with indications of promise, has been done in degassing zinc and zinc alloys. Nitrogen degassing of zinc is being tried to reduce dissolved hydrogen and to float zinc oxides and non-metallics to the surface to obtain sound metal for further processing. Treatment of molten zinc for galvanizing purposes may not only provide a more uniform temperature for the molten zinc alloy, but also prevent premature failure of the coating. Some metallurgists believe that such failures are caused by the undissolved hydrogen in the zinc coating which is transferred to the steel.

Lead: Degassing of lead is being done on a production basis to remove oxides and other foreign material, especially if scrap accumulations from leading operations are remelted. The nitrogen is introduced through a steel pipe, capped on one end and with small holes drilled radially near the capped end.

AMERICAN FOUNDRYMAN reporters for the Ohio Regional Foundry Conference were E. J. Ash, Ohio Malleable Iron Co., R. E. Daine, Aluminum Company of America, H. G. Schwab, Bunting Brass & Bronze Co., Wilfred H. White, Jackson Iron & Steel Co. Photographers were Thomas W. Gallagher, Lake City Malleable Co., and Sterling N. Farmer, Sand Products Corp.

A. F. S. National President Walton L. Woody (left), National Malleable & Steel Castings Co., Cleveland, emphasizes a point in chat with Fred J. Pfarr, Lake City Malleable Co., Cleveland, president of the Northeastern Ohio Chapter, during the banquet of the Fourth Ohio Regional Foundry Conference last month.

STRESS FOUNDRY FUNDAMENTALS AT OHIO REGIONAL CONFERENCE

WITH THE THEME "Basic Approaches to Foundry Problems," the Fourth Ohio Regional Foundry Conference was held at Case Institute of Technology in Cleveland March 9 and 10. General chairman was S. E. Kelly, Eberhard Mfg. Co.; general secretary was R. D. Walter, Archer-Daniels-Midland Co., also of Cleveland. Sponsors of the conference were the five Ohio chapters of A.F.S.—Northeastern Ohio, Toledo, Canton District, Central Ohio, and Cincinnati—with Northeastern Ohio as host.

Conference Chairman Kelly opened the two-day meeting with the introduction of Dr. Elmer Hutchinson, acting president of Case Institute of Technology, who welcomed foundrymen to the school. Mr. Kelly paid tribute to committee members who worked together to plan and execute the conference.

Lead Off On Sand Control

Harry W. Dietert, Harry W. Dietert Co., Detroit, initiated the series of technical meetings with a discussion of the elements of sand control. There is need, he said, not only for sand control, but for overall control in all departments of a foundry. All operating details must be a matter of record, he declared, and routines must be established and followed.

Luncheon speaker was George K. Dreher, Foundry Educational Foundation, Cleveland, who asked his listeners *"Is This Where We Came In?"* He outlined the advances in foundry technology and the improved production facilities of recent years to show how much better prepared the industry is today for meeting high production requirements.

The afternoon of the first day was devoted to two sets of simultaneous meetings on patternmaking, and gray iron, non-ferrous, malleable, and steel foundry practice. At the first pattern session, George D. Webber, Webber Gage Co., Cleveland, described and demonstrated the use of gage blocks, fixtures, and accessories in the work of the patternmaker. Michael A. Horlak, Case Institute of Technology, presided.

Gray iron foundrymen heard H. H. Wilder, Vanadium Corp. of America, Detroit, outline practice of operating a cupola in a permanent mold foundry. Absence of sand on return scrap requires addition of 8 to 12 lb of silica rock per ton of charge, he stated, to prevent corrosion of the lining by the flux used. Screening out coke smaller than 2 in. improved melting so that less coke was used, he said. Chairman of the meeting was W. A. Kramer, Advance Foundry Co., Dayton, Ohio.

"Fundamentals of Control of Non-Ferrous Foundry Sand" by Wm. R. Ball, R. Lavin & Sons, Chicago, centered about natural bonded sands and methods of tailoring them to fit the type of castings being produced. Natural sands can serve as a base for semi-synthetic sands by suitable additions of clay, cereal binder, and seacoal, it was brought out. E. C. Sawyer, Ayers Mineral Co., Zanesville, Ohio, presided.

In the first malleable session, Ralph Hassett, Texas Foundries, Inc., Lufkin, Tex., described core blowing as

Table of happy foundrymen (left) enjoying table chatter at Ohio Regional banquet. At right is John Manos,

Lake City Malleable Co., chairman of a malleable iron session on refractories for melting and annealing.

practiced in his foundry. Advantages he gave for core blowing included uniformity of product and an increase in production as high as six-fold over hand ramming. Among practical hints he gave were locating the blow hole over a print, if possible, and use of adequate number of vents to minimize blowing at the parting line. R. H. Olmsted, Whitehead Brothers Co., Conneaut, Ohio, was chairman.

C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala., described production of steels with higher than normal silicon content and influence of melting practice and final deoxidation on steel quality. Chairman was T. W. Daniels, Carnegie-Illinois Steel Corp., Canton, Ohio. Silicon-killed steels can be cast sound in green sand without aluminum deoxidation, according to Mr. Donoho, and he listed among other conclusions to his work: reversion to pin-hole porosity with excessive silicon, improvement in strength with minimum sacrifice in ductility, and sensitivity to heat treatment.

Core Blowing Recommendations

Continuing the sessions late in the afternoon, Elmer Blake, Osborn Manufacturing Co., Cleveland, recommended for core blowing: ample dry air at 80 psi or more; carefully controlled moisture in the sand; vents at higher levels (as well as in the bottom) so they won't be plugged by first sand into the box and vents near bosses. Easy blowing of high bosses, he said, can be accomplished by using a blow bushing with 0.01 in. annular clearance for escape of exhaust air. Carl Winkler, Cleveland Standard Pattern Works, was chairman.

In the gray iron session, W. A. Geisler, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., discussed the fundamentals of the shell molding process and said its advantages include high production rate, maintenance of close dimensional tolerances, accurate reproduction of fine detail, and smooth casting finish. Chairman of the meeting was Jos. S. Schumacher, Hill & Griffith Co., Cincinnati.

Elements of magnesium founding with special reference to melting were covered by W. C. Newhams, Aluminum Co. of America, Cleveland, in the second non-ferrous session. E. J. Vargo, Wellman Bronze & Aluminum Co., Cleveland, presided. Use of a dry flux to protect the melt, grain refinement by superheating and rapid cooling to the pouring temperature, and degassing with dry nitrogen or chlorine were described. Proper gating and use of inhibitors in the molding sand were brought out.

Fitz Coghlin, Jr., Albion Malleable Iron Co., Albion, Mich., said, in the malleable session, that the five factors in successful duplexing are selection of equipment, control of raw materials, operating personnel, operating standards, and good preventive maintenance. He urged preparation of a working manual covering use and care of equipment, good housekeeping rules, job descriptions, and delegation of authority. Joseph Dvorak, Eberhard Mfg. Co., presided.

"Some Things We Know and Don't Know About Cast Steel" was the subject of C. E. Sims, Battelle Memorial Institute, Columbus, Ohio. Presiding at the session was Harold Templeton, Babcock & Wilcox Co., Wadsworth.

The conference banquet concluded the first day. Toastmaster was Northeastern Ohio Chapter President Fred J. Pfarr, Lake City Malleable Co., Cleveland. National officers and directors who spoke briefly were: Walton L. Woody, National Malleable & Steel Castings Co., national president; Walter L. Seelbach, Superior Foundry, Inc., national vice-president; and V. J. Sedlon, Master Pattern Co., national director; all are from Cleveland. Banquet speaker was Col. Jack Major, Paducah, Ky.

The second day of the Ohio Regional Foundry Conference opened with the traditional breakfast for foundry engineering graduates of Ohio State University, with Prof. D. C. Williams presiding. Two sets of technical meetings and a luncheon concluded the conference program.

Franz Schumacher, Cooper Alloy Foundry Co., Hillside, N. J., was speaker before the patternmakers, explaining applications of metal spraying. Chairman of the meeting was Ralph Whaling, P.M.S. Foundry Co., Cleveland.

At the Conference banquet, left to right, are National Director V. J. Sedlon, Master Pattern Co., Cleveland, Conference Chairman S. E. Kelly, Eberhard Mfg. Co., Cleveland, Col. Jack Major, banquet speaker, mugging for cameraman, and A.F.S. National Vice-President Walter L. Seelbach, Superior Foundry Co.

Studies of casting-test bar relations show that a 1-in. plate, a 2-in. round, and a 3-in. cube have essentially equivalent cooling rates, according to Richard A. Flinn, American Brake Shoe Co., Mahwah, N. J., in a gray iron session. He discussed test bar selection to represent, metallurgically, the most critical sections in a casting, and stressed the importance of designing for the properties required in the most critical sections. John F. Kahles, Metcut Research Associates, Cincinnati, presided.

In the early morning non-ferrous session, Wm. N. Brammer, Apex Smelting Co., Chicago, said that the tendency for aluminum to dissolve hydrogen and to be readily oxidized must be controlled to produce sound castings. He recommended a duplex melting cycle and special attention to removal of oxides and moisture from the metal charge. Hard spots occasionally found in castings may be due to silicon carbides, aluminum oxide, or iron oxide, he pointed out. K. Stromberger, U. S. Reduction Co., presided.

Heating time and temperature differential, stated Victor Paschkis, Columbia University, in the malleable session,

(Continued on Page 180)

TENTH A.F.S. STUDENT CHAPTER INSTALLED AT NORTHWESTERN TECHNOLOGICAL INSTITUTE

NORTHWESTERN University Student Chapter, the Society's tenth, was installed at a ceremony in the faculty lounge of the Technological Institute February 28 by A.F.S. Secretary-Treasurer Wm. W. Maloney. Student Chapter Chairman A. Putnam Volkmar, presided. Prof. Burgess H. Jennings, chairman of the mechanical engineering department, welcomed A.F.S. to Northwestern and assured the group of full support of the school administration.

Tells Career Opportunities

Industrial adviser to the chapter, Past National Director Bruce L. Simpson, National Engineering Co., Chicago, assured the students of the possibilities for advancement in the foundry and warned them that it is not a "lace pants" industry. C. V. Nass, Pettibone-Mulliken Corp., chairman of the Chicago Chapter, complimented the students on their enthusiasm and invited them to call on the Chicago group for assistance in their programs and activities.

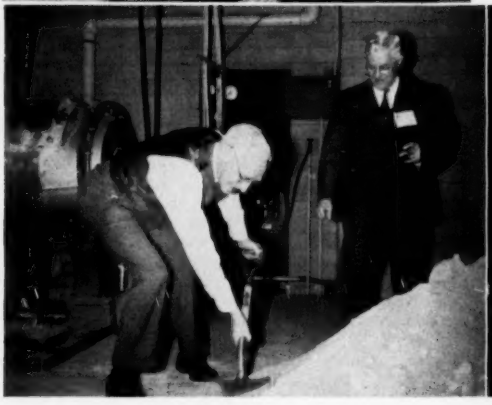
Recalling student days when he attended his first A.F.S. Convention, Secretary Emeritus R. E. Kennedy, University of Illinois (Navy Pier), told how he came to know of the friendship and cooperative spirit of foundrymen. Greetings from the Society's first student chapter at the University of Minnesota were brought by Prof. Fulton Holtby of Minneapolis.

Representing the national officers and directors was Director James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., who expressed their good wishes for the success of the new student chapter.

Installation by Secretary-Treasurer Maloney followed his address in which he told what A.F.S. is and how it operates. He showed how each industry representative present or his company had long profited by Society affiliation and had been active in its affairs. The cast iron rattle passed to Student Chairman Volkmar as a symbol of baby chapterhood was recently recast by Kenneth Spray, Michigan State College Student Chapter member, to convert the seal from A.F.A. to A.F.S., it was explained.

Others who spoke were: Professor Donald H. Whitmore and Willis T. Chandler, faculty advisers; Herbert F. Scobie, editor, AMERICAN FOUNDRYMAN; and Frank D. O'Neil, Western Foundry Co., Chicago. Officers of the student chapter, in addition to chairman Volkmar, are *vice-chairman*, Joseph Alber, and *secretary-treasurer*, Robert Ball.

A.F.S. Secretary-Treasurer Wm. W. Maloney (center) has Northwestern Student Chapter pre-installation supper with (left) Prof. Roy W. Schroeder, University of Illinois (Navy Pier), and (right) Frank D. O'Neil, Western Foundry Co., Chicago. Below, left—A.F.S. Secretary Emeritus R. E. Kennedy, University of Illinois (Navy Pier), shows National Director James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., how he used to cut over a heap of molding sand, during visit to Northwestern University's foundry. At right, A. Putnam Volkmar, chairman of the new student chapter, pours coffee for (starting left) Chicago Chapter Chairman C. V. Nass, Pettibone-Mulliken Corp., Gilbert H. Van Schaik, Whiting Corp., Harvey, Ill., and Student Members Thomas H. Brinkman and James L. Calhoun. Supper and installation were in the Institute's faculty lounge.



CORE OIL EVALUATION METHOD

A. E. Murton*
H. H. Fairfield*
and
B. Richardson*

DURING A COMPARATIVE INVESTIGATION of 19 commercial core oils, and several prospective binder materials carried out in the sand laboratories of the Mines Branch at the request of the Steel Castings Institute of Canada, certain findings appeared to be of general interest. These features include:

(1) The addition of heating elements at the bottom of the laboratory core oven, and the installation of a positive adjustable draft system (late model core ovens have, as standard equipment, reflector plates which reflect heat toward bottom of cores).

(2) A method of assessing core oils by means of oak-tree contour curves[1] for comparing the baking characteristics of two or more binder materials.

(3) The effect of humid storage on the strength of baked cores.

(4) The effects of high oven humidities on the baked strength of core oils.

Core Oven Alterations

In the testing of core oils certain inconsistencies inherent in such naturally occurring substances as sand and vegetable oils impose themselves upon a system of testing which already has room for variation in results. The strength of cores made using the same core oil with AFS 50/70 test sand and distilled water, mixed, rammed up and baked under closely controlled duplicate conditions[2] will vary from day to day for reasons which are not yet apparent.

This day-to-day variation was reduced to some extent by alterations to the core baking set-up at the Mines Branch. Three 1,000-watt domestic stove heating elements of the "calrod" type were coiled in a ½-in. deep well in the transite board which forms the base of the core oven. Two of these elements are manually controlled; the third is thermostatically controlled by a Dekhotinsky-type thermostat similar to the one which originally came with the oven. The new thermostat was mounted where it would be below the cores during the time of bake (the thermostat originally supplied is mounted just above the core baking region).

The lower thermostat and thermometer can be drawn out to allow passage of the core trays. This new arrangement ensures a close temperature control both above and below the cores throughout the baking cycle, and the total variation amounts to less than ± 2 F as read on the oven thermometers.

In the original installation the 4-in. chimney pipe from the core oven was led out through a window, with the result that on certain windy days the core gases were blown back in the pipe and out the oven door. An exhaust fan consisting of a size "O" utility blower directly connected to a 1/20 hp, 1800 rpm, 60 cycle motor was placed in the smoke pipe. This fan provided a positive exhaust, but the wind still had some effect on the speed of bake, so a draft gage was installed, the leads from which go to either side of an orifice plate with a 1-in. diameter hole[3] installed in the 4-in. chimney pipe. A damper in the pipe is regulated to give a pressure difference across the orifice of 0.25 in. of water, and this pressure is closely maintained at all times.

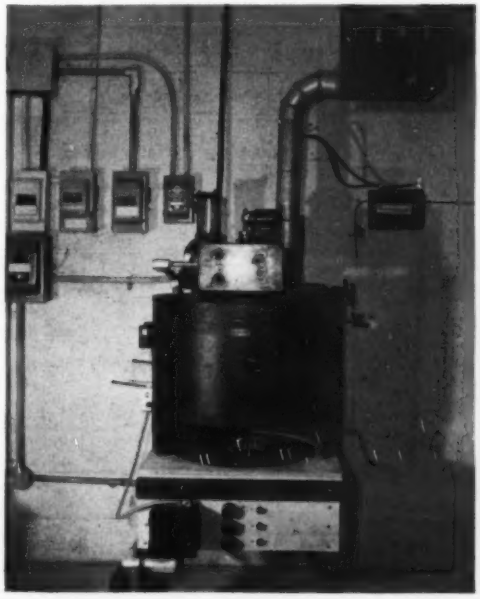
These changes may be seen in Fig. 1, which shows the core oven with the door removed so that the new heating coils may be seen. The thermostats and thermometers mounted above and below the baking zone in the oven may be seen on the left-hand side. The exhaust fan and draft gage are above and to the right of the oven.

Improvements in operation resulting from the oven modifications are:

(1) The oven comes to temperature much more quickly.

(2) Baking temperatures are maintained within ± 2F both above and below the baking cores.

Fig. 1—Core oven with door removed to show electric heating elements in bottom. The control thermostats are on the left-hand side of the oven; draft gage is on wall at right, and exhaust fan above draft gage.



*Metallurgist, Physical Metallurgy Div., Mines Branch, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada; chief metallurgist, Wm. Kennedy & Sons Co. Ltd., Owen Sound, Ont., Canada; and research engineer, Steel Castings Institute of Canada, Ottawa, Ont., Canada, respectively.

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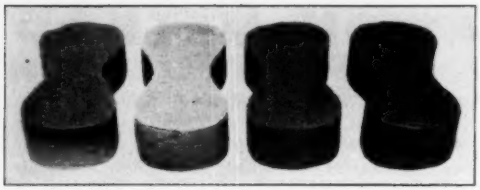


Fig. 2—Cores on left were baked with lower heating element off. Core on extreme left is top-side up, next core bottom-side up. Cores on right were baked same length of time at same temperature (baked 40 min at 450F) with upper and lower heaters on.

(3) When a full load of cores is placed in the oven the temperature drops, but the baking temperature is recovered more quickly since the new heaters were installed in the bottom of the oven.

(4) The "band" of results for baking the same core mix at 400F on different days has been narrowed by about one half for this particular core oven.

(5) The cores are baked to the same hardness on the bottom and on the top.

A possible disadvantage in all-electric baking is the lack of combustion gases from the burning of fuel. The pressure of these gaseous products does have an effect on the baking process in oil- or gas-fired ovens[4] so that the results of cores baked in the all-electric oven are comparative among themselves but cannot be compared directly with test cores baked in a fuel-fired oven.

Cores containing a bake-out dye were baked with the new bottom heating coils on and off. The two cores on the left in Fig. 2 were baked with the bottom elements turned off. The core on the extreme left is top side up and the one next to it is bottom side up. Shading from dark to light may be seen on the ends of these cores. The two cores on the right in Fig. 2 were rammed from the same mix but baked with both top and bottom elements turned on. All cores in this test were baked 40 min at 450F. The cores on the left crumbled on the bottom although they were hard on top. Those on the right were hard top and bottom.

The band of results for one core oil on the conventional core baking curves at the maximum strength for a 400F bake was approximately 42 psi wide previous to the core oven alterations, and is now about 18 psi wide at the same location for the same core oil.

Assessing Core Oils by Baked Strength Testing

In the evaluation of core oils on the basis of baked strength, the requirements to be considered for steel foundry cores are:

(1) Rapid strength attainment so that large cores will not require excessive baking time.

(2) Hold strength for a long time in order that small cores will not be burned out while the large cores are being baked through, and so that the large cores will not be overbaked on the outside before the inside is thoroughly cured.

(3) Not be too sensitive to ordinary variations in oven temperature.

(4) Bake up at reasonably low temperatures for fuel economy in the core oven.

(5) Economical in satisfying these requirements.

In testing core oils a standard mixture is prepared. The mixture used in this investigation consisted of A.F.S. 50/70 test sand, 3000 grams; test core oil, 30 grams; distilled water, 90 grams.

The A.F.S. tensile test cores were rammed and baked. The relationship of baking time, temperature, and tensile strength is shown in Fig. 3. This curve shows that with core oil (A) a strength of 125 psi was reached in 280 min when baked at 300F; 67 min at 350F; 45 min at 400F; and 35 min at 450F.

Compilation of a graph such as shown in Fig. 3 requires a great deal of test work. Fortunately, the patterns of such curves for vegetable-base core oils have common characteristics, and after completing similar graphs for 20 commercial core oils certain trends became apparent for all of the oils tested:

(1) Oil-sand mixtures attain maximum strength more quickly when baked at high temperatures than at lower temperatures.

(2) Oil-sand mixtures retain maximum strength over a longer bake time interval at lower temperatures.

(3) The curve shown in Fig. 4 was taken from the

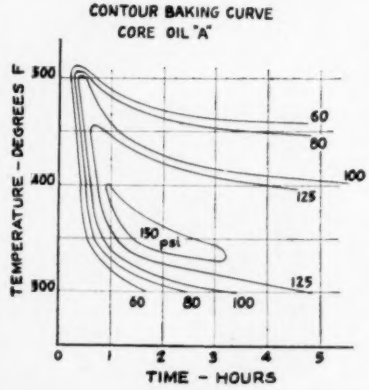
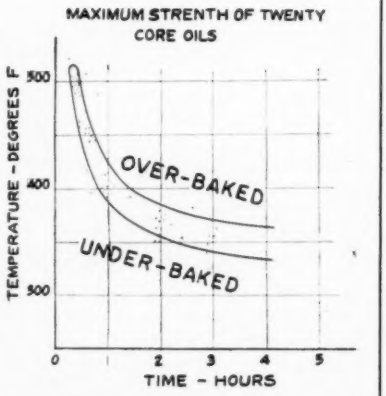


Fig. 3 (left)—Relationship of baking time, temperature, and tensile strength is shown in contour-type baking curve (core oil A).

Fig. 4 (right)—Curve showing time-temperature area where maximum strength of satisfactory core oils should fall.



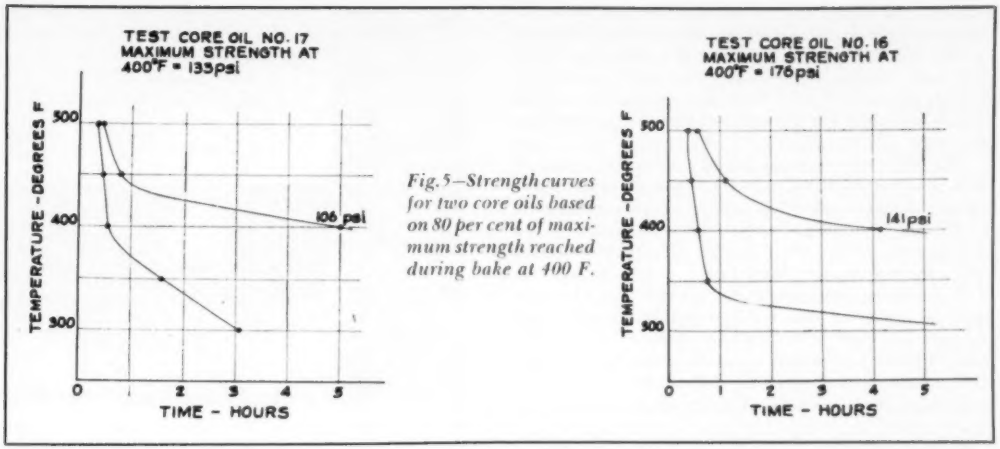


Fig. 5—Strength curves for two core oils based on 80 per cent of maximum strength reached during bake at 400 F.

results of complete baking tests for 20 core oils. Within the loop are plotted the time-temperature points for the attainment of maximum strength for the satisfactory core oils. Where the maximum strength of any oil at any temperature fell below the loop, those oils tended to underbake. When the maximum strengths fell above or to the right of the loop, those oils tended to overbake.

It is suggested that the evaluation of commercial core oils be carried out as follows:

(1) Bake cores at 400F for 30, 45, 60, 90 and 100 min using a standard mix.

(2) Record maximum baked strength.

(3) Plot the baked strength and record: (a) time to reach 80 per cent of maximum strength; (b) time when overbaked core drops below 80 per cent of maximum tensile strength.

(4) Those oils which have suitable characteristics can be rated in terms of cost of oil per ton of core sand mixed to give 200 psi maximum strength at 400F.

Figure 5 shows curves for two core oils based on 80 per cent of the maximum strength reached during a bake at 400F. It is immediately apparent that oil No. 16 bakes to a strength of 141 psi more rapidly than oil No. 17 bakes to a strength of 106 psi. Economics permitting, the strength of oil No. 17 could be increased by using more oil, with the possible consequent disadvantage of a larger gas evolution in the mold, but there is no guarantee that it would bake up any faster. Table 1 gives suggested rated values for core oils according to this scheme based on 1-in. A.F.S. tensile specimens standard-rammed from core mixes containing 1 per cent test oil and 3 per cent distilled water in A.F.S. 50/70 test sand, and baked in the oven previously described.

Arbitrary Standard: An alternative method of assessment is suggested where complete baking cycles are carried out at 300, 350, 400, 450 and 500F and results plotted as in Fig. 3. Core oil can be assessed on the basis of an arbitrary standard and for this method a fixed standard of 125 psi was selected. Figure 6 shows the 125 psi curves for the same two oils represented in Fig. 5. Oil No. 16 comes up to 125 psi tensile strength in about 39 min, holds that strength for 4 hr with an allowable variation in baking temperature of minus 35F plus 30F. Oil No. 17 requires just about 1 hr 54 min to reach a strength of 125 psi, holds that strength for only 4 hr with, at times, no allowable variation in oven temperature. Oil No. 16 would bake up just about as well at 350F, whereas oil No. 17 would not.

Based on the 125-psi criterion and on test data taken from baked strength results on 19 commercial core oils, assessment standards are given in Table 2.

Effect of Humid Storage on the Strength of Baked Cores

One of the most significant tests in this series was the one concerned with the drop in strength of baked cores stored for 24 hr at various humidities from zero to 100 per cent. The results appear to be of immediate practical importance to foundries located in those parts of the country where the humidity hovers between 70 and 80 per cent or higher for many months of the year. While humidity has a temperature co-

TABLE 1—BAKED STRENGTHS FOR CORE OILS RATED ON 80% OF MAX. STRENGTH AT 400F.

Oil Rating	Time at 80% of Max. 400 F Baked Strength for 375 F Bake, min		Lowest Temp. of Bake for Standard Strength, F	Allowable Variation in Oven Temp., F
	From	To		
Above Avg.	45	300	350	60
Avg.	60	300	350	40-60
Below Avg.	75	300	365	20-40
Poor	75 plus	270	365 plus	20 or less

TABLE 2—BAKED STRENGTH FOR CORE OILS RATED ON BASIS OF 125 PSI AT 375F.

Oil Rating	Time at 125 psi, Baked at 375 F, min		Lowest Baking Temp., for Standard Strength, F	Allowable Variation in Oven Temp., F
	From	To		
(A) Above Avg.	45	300	350	60 plus
(B) Avg.	60	300	350	40-50
(C) Below Avg.	60	270	365 plus	20-40
(D) Poor	60 plus	270	365 plus	20 or less

efficient, the same 70 grains of moisture per pound of dry air which give about 90 per cent relative humidity at 60F will still give the air at 70F a humidity of 65 per cent. Fairly high indoor humidity conditions usually persist in Eastern Canada from the time of the spring breakup right through summer and up until the first cool days of fall.

The annual percentage relative humidity taken at 8:00 a.m. for many years in some United States cities having climates somewhat similar to cities and towns in Canada are: Bismarck, N. D., 81; Burlington, Vt., 77; Buffalo, N. Y., 78; Chicago, Ill., 76; Milwaukee, Wis., 78; Port Huron, Mich., 81.

It can be assumed that the 75 per cent humidity test will be closest to that encountered in foundry core storage, and some of the test cores were seriously weakened when stored at that humidity. One hundred per cent humidity lasting 48 hr will be encountered occasionally in Eastern Canada during a warm rainy spell.

Method of Testing: The cores were standard rammed A.F.S. tensile specimens baked for 90 min at 400F. The core mix was made up as follows: 1500 grams A.F.S. 50/70 test sand; 15 grams test oil; 45 grams distilled water.

Sixteen cores were rammed up for each test oil, baked together and stored at room temperature for 24 hr at different humidities. Four of the oil cores were stored in dry air while the remaining 12 were stored—one lot of four cores at 50 per cent relative humidity, one lot of four at 75 per cent relative humidity, and one lot at 100 per cent humidity. Table 3 gives the results of these tests.

Further work should be directed toward finding an ingredient which, while not harmful to the desirable qualities, might lessen the tendency of the cores to weaken in storage. In the meantime dry storage of cores could be considered. In this connection 25 per cent relative humidity would probably be a safe level. Also, most of the weakening of the cores seems to take place within the first 24 hr in storage.

Cores which have been weakened by storage at high humidities do not recover their strength by further storage at low humidities. The strength can, however, be recovered by redrying the cores in an oven at about 220F.[4]

Variations in humidity have long been blamed for variations in the baked strengths of test cores. The effect of this factor was studied by baking 20 core oils with high oven humidities at 400F and comparing the results with those obtained on the same oils at normal humidities.

To make this test the core oven previously described was fitted with an evaporating pan placed over the bottom heating coils, as shown in Fig. 7. Sufficient water was dripped into the pan at a constant rate through the needle valve-funnel arrangement to give a dew point in the oven of about 120F. The full line in Fig. 8 shows the average of 29 test bakes of 20 core oils, 19 of which were baked once each, while the twentieth was baked 10 times at usual humidities.

TABLE 3—BAKED TENSILE STRENGTH FOR CORES STORED 24 HOURS AT ROOM TEMPERATURE AT RELATIVE HUMIDITIES AS SHOWN.

	Baked Strength, psi			
Oil No.	"Dry" Storage	50% R.H. Storage	75% R.H. Storage	100% R.H. Storage
1	166	150	135	82
2	136	134	129	91
3	200	175	146	84
4	151	138	124	88
5	146	146	118	82
6	190	184	174	131
7	191	174	159	119
8	165	156	144	106
9	196	180	160	137
10	155	149	126	97
11	118	109	103	75
12	124	105	74	45
13	136	122	91	55
14	157	151	133	86
15	15.5	12.7	11	—
16	185	174	159	110
17	140	122	88	62
18	207	188	156	111
19	137	122	91	51
Avg.	154	142	122	85

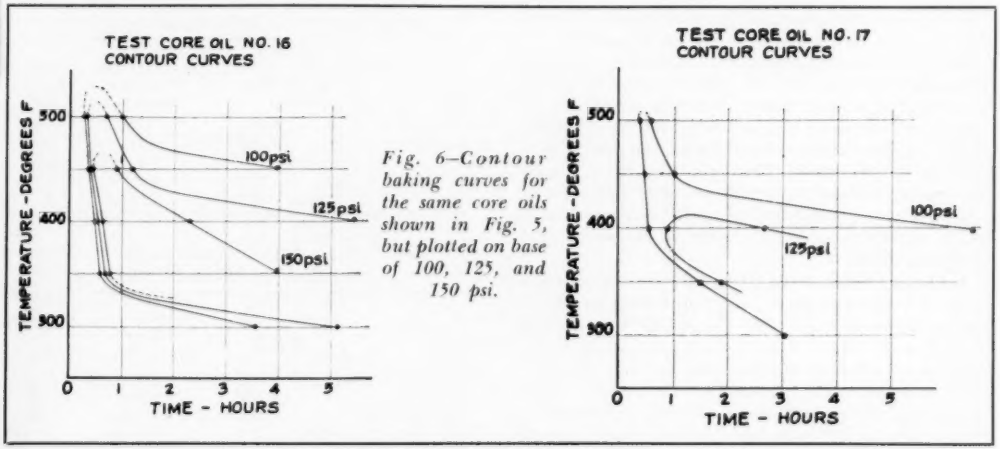


Fig. 6—Contour baking curves for the same core oils shown in Fig. 5, but plotted on base of 100, 125, and 150 psi.

Fig. 7—Below—The core oven was fitted with an evaporating pan placed over the bottom heating coils for humid baking of test cores. Right—Needle valve and funnel arranged to control flow of water to the evaporating pan.

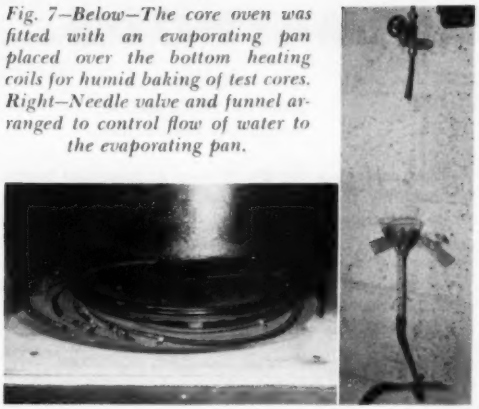
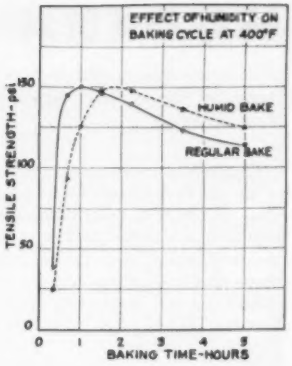


Fig. 8—Curves showing effect of high oven humidity on baking speed at 400F. The curves are averages of 29 bakes. Maximum strengths are not affected.



The dotted line is the average for 29 exactly similar bakes except at the high humidity. All of the oils were found to be affected when results for the individual core oils were compared. The two sets of averages from this large number of samples leave little doubt as to the general effect of oven humidity. It will be seen that the moisture level in the core oven does not affect the strength of oil in sand cores but does affect the time of bake.

Theoretically, such a result is to be expected when it is realized that a large part of the baking time for cores is consumed in evaporating off the water which the cores contain, and that once this water has been removed, the oil in the cores bakes up very rapidly. It is, then, only to be expected that a high partial pressure of water vapor in the oven atmosphere would extend that portion of the baking time devoted to the removal of water from the cores. The results of this study tend to confirm the theory.

Further work is being directed toward finding the relationship which would seem to exist between oven humidity and the displacement of the humid bake curve shown in Fig. 8.

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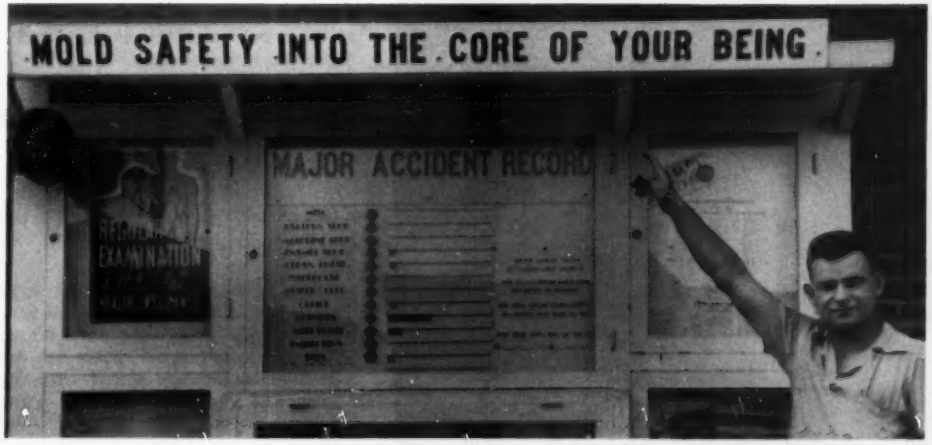
1. Harry W. Dietert, FOUNDRY CORE PRACTICE, American Foundrymen's Society, Chicago (1950).
2. FOUNDRY SAND TESTING HANDBOOK, American Foundrymen's Society, Chicago (1944).
3. Ovid W. Eshbach, *Handbook of Engineering Fundamentals*, John Wiley & Sons, New York.
4. Unpublished results of continuing studies at the Mines Branch, Dept. of Mines & Technical Surveys, Ottawa, Ont., Canada.

Foundry Safety Slogan Wins Its Author A Washing Machine



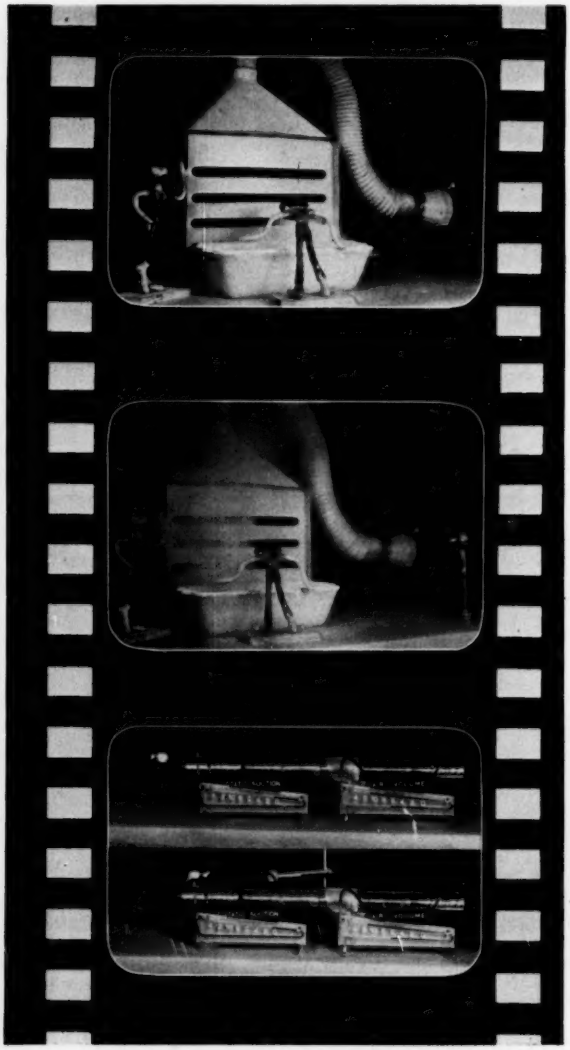
Joseph Wise, a member of the Inspection department of American Radiator & Standard Sanitary Corp.'s Baltimore Works, points proudly to the foundry slogan, "Mold Safety into the Core of Your Being," which won him an automatic washing machine in a recent plant contest.

MODERN FOUNDRY METHODS...

AIDS IN SELECTING PROPER FOUNDRY VENTILATION

K. E. Robinson and
Robert S. McClintock, Jr.
Michigan Department of Health

To help ventilation-conscious foundrymen select some of the proper equipment for making the foundry a better place in which to work, Robert S. McClintock, Jr., district engineer of the division of industrial health, Michigan Department of Health, developed models to demonstrate how ventilating should be done as well as how it should not be done. Presented before a number of foundry groups, with K. E. Robinson, consulting ventilation supervisor for the division of industrial health, as narrator the demonstration and description illustrate principles of dust and fume removal, explain significance of static suction and air volume measurements, and show how mancoolers improperly used can markedly reduce ventilating equipment effectiveness. The popular demonstration has been recorded on a sound, black and white motion picture film.



A typical foundry shakeout hood can be highly satisfactory and allow equipment to be used on three sides and over the top. Chemical smoke simulating dust and fume is rapidly drawn into slotted hood. Workmen in vicinity are comfortable.

Shakeout hood cannot control dust if mancoolers and other air moving devices are operating in near vicinity.

Wisp of smoke going into tube at left in upper half of frame shows how air is drawn into the face of an open duct. Below, the smoke is drawn from behind the duct, demonstrating the principle that if air were exhausted by a point source of suction it would be drawn in the shape of a perfect sphere.

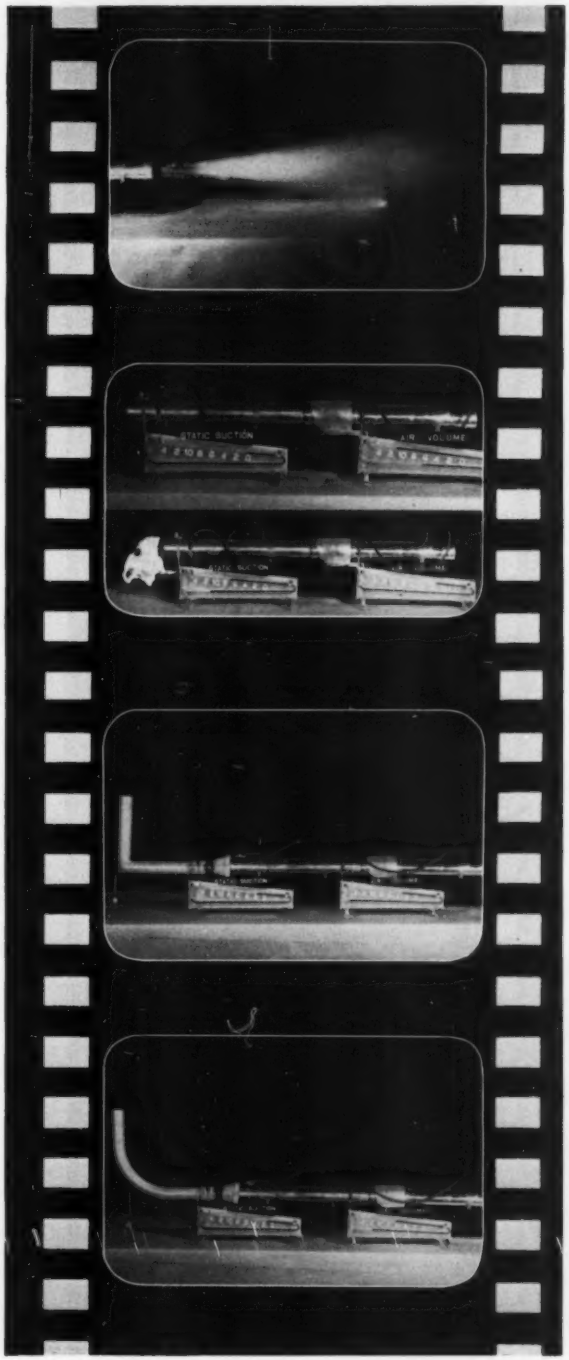
...MODERN FOUNDRY METHODS

Although air velocity drops off in front of a suction hood very rapidly, discharge at a high velocity will carry for a long distance.

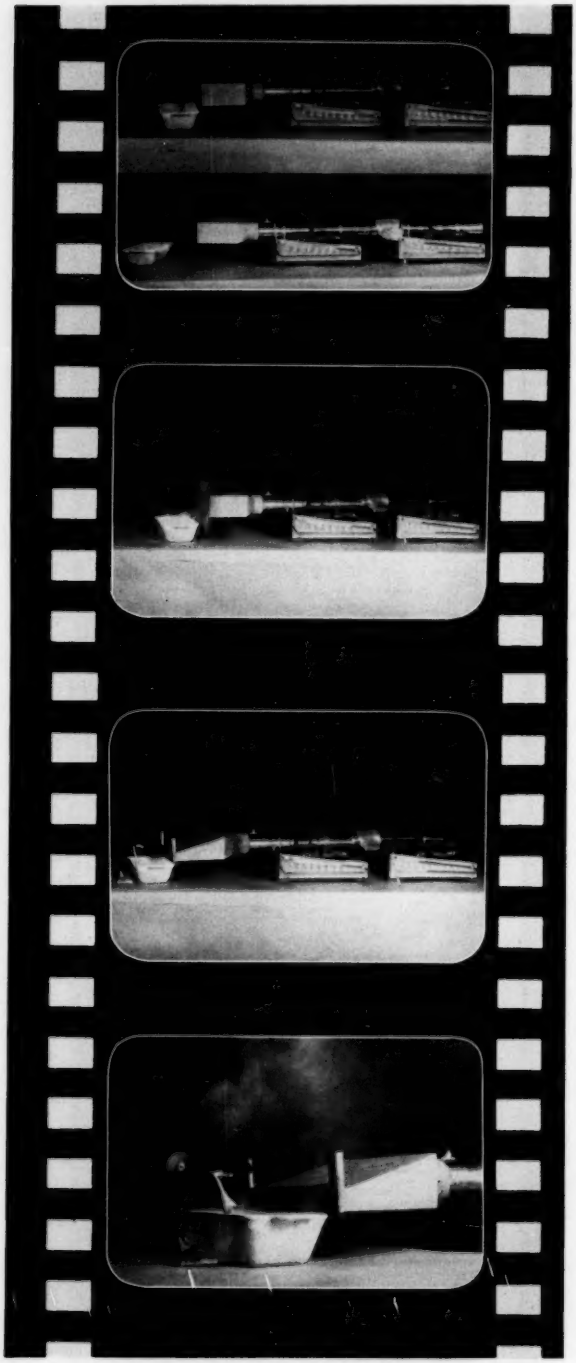
Upper half of frame shows that an open tube has practically no static suction although carrying a high air volume. Many believe that high static suction is proof of good dust control. The lower half of the frame shows the duct plugged to produce a high static suction but the volume has dropped to nearly zero. Control is indicated by a high air volume and a system can have high static suction and still not have sufficient air for control.

Bad elbows and fittings seriously reduce the effectiveness of an exhaust system. This square elbow has reduced the air volume and increased the static suction. Compare with the figures below and above.

The same system with a good elbow has less static suction and an increased air volume.



MODERN FOUNDRY METHODS...



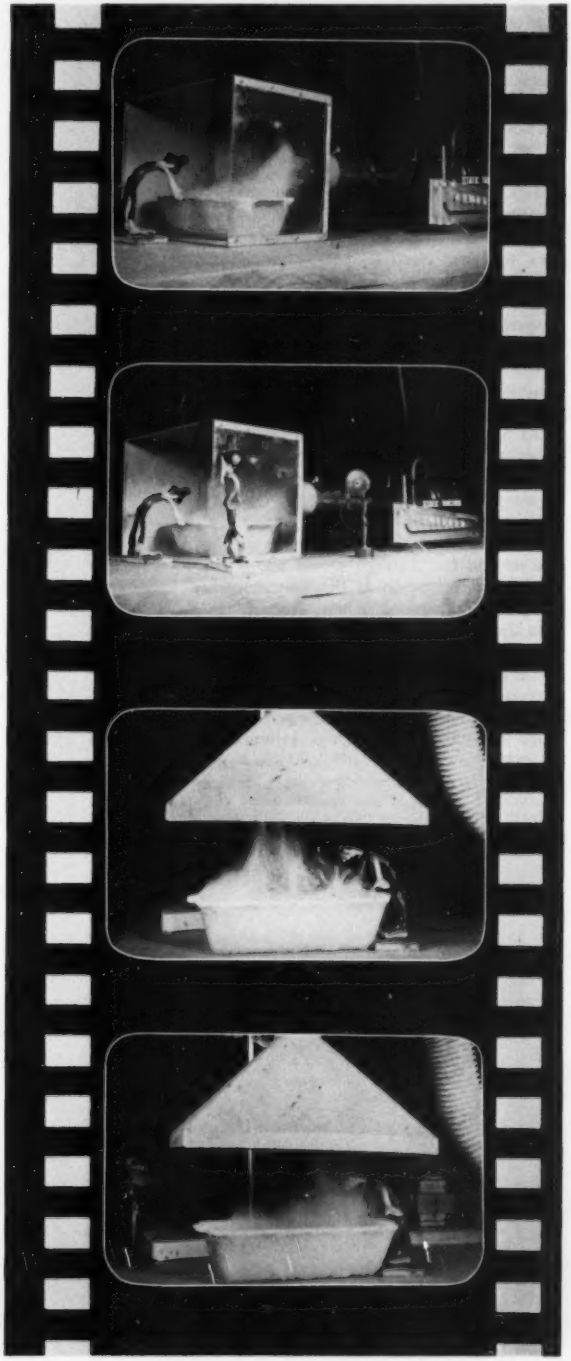
Air contaminant in upper half of frame is under partial control. A short distance from the hood control is lost entirely and smoke moves at random.

A baffle on a hood placed close to the contaminant results in far better control than in either of the above illustrations.

This slot type hood is maintaining good control. Air is drawn over the man, then over the source of air contamination. Work area is open for overhead conveyors and hoists.

Cross-drafts from mancoolers or other sources make control impossible even when an otherwise effective slot type hood is used.

...MODERN FOUNDRY METHODS



Where it can be used, a booth gives excellent control. As in case of slot type hood, air is drawn over operator before passing over source of contamination.

Properly placed mancoolers do not interfere with control afforded by booth.

Canopy hoods are often used, but they are not satisfactory if a man must work over the contaminant as shown here.

Strong cross-drafts further decrease the value of a canopy hood.

EVALUATE METAL PENETRATION VARIABLES

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THE PHENOMENON known as metal penetration has troubled foundrymen for years. It has been recognized that a major research effort is necessary if this complex problem is to be solved. When metals of low melting point are cast, usually not much difficulty is encountered with penetration; that is, if fine sand is used and good ramming is employed.

Steel, bronze and other copper alloys are probably the greatest offenders insofar as metal penetration is concerned; cast iron also gives trouble at times but to a much lesser extent. The major part of this paper deals with the work carried out on steel. Some references are made to bronze and cast iron, mainly to show that some of the factors involved are fundamental to the penetration of all metals.

Figure 1 illustrates what is meant by metal penetration, which is often referred to as "burn-on." This is a section cut through a core which is penetrated.

Metal penetration is the name applied to surface roughness produced when molten metal is forced into the interstices between the sand grains for a considerable distance. An interlocking mass of sand and metal is produced whose thickness is over $\frac{1}{16}$ in. If the surface roughness or adherence is less than $\frac{1}{16}$ in. the term "burn-on" is used. This terminology is an arbitrary standard set up for convenience. Figure 2 shows an example of "burn-on" (less than $\frac{1}{16}$ in.).

Figure 3 is a phosphor bronze casting taken from a paper by Morey and Kattus.[1] This casting shows "veining"—the fins protrude over the surface of the casting. At the right of the casting is another example of metal penetration. This casting shows veining to be associated with metal penetration (right) and veining without penetration (left) so that the veining mechanism should be considered separately from metal penetration.

Some idea as to the complexity of the problem of metal penetration can be obtained by the number of factors which must be considered in an investigation on metal penetration. Several are indicated below. These are given at random and in no specific order of importance.

(1) Surface tension of the molten metal.

(2) The wetting characteristics of the metal on the sand mixture.

(3) Temperature of the metal in the mold.

NOTE: This paper is published by permission of the Director-General of Scientific Services, Dept. of Mines and Technical Surveys, Ottawa, Ont., Canada. It has been presented at the 1951 A.F.S. Wisconsin Regional Foundry Conference, and at a meeting of the Eastern Canada Chapter.

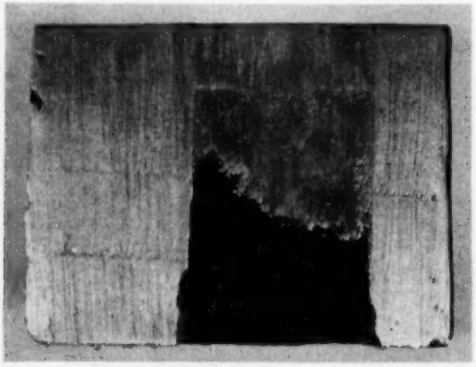


Fig. 1—Casting section, cut through the core, shows metal penetration occurred in approx. one-half the core.

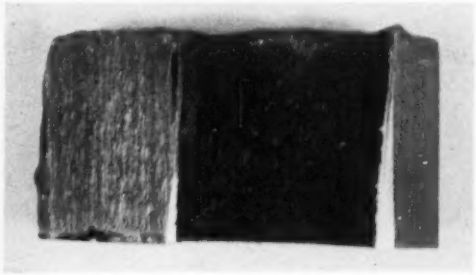
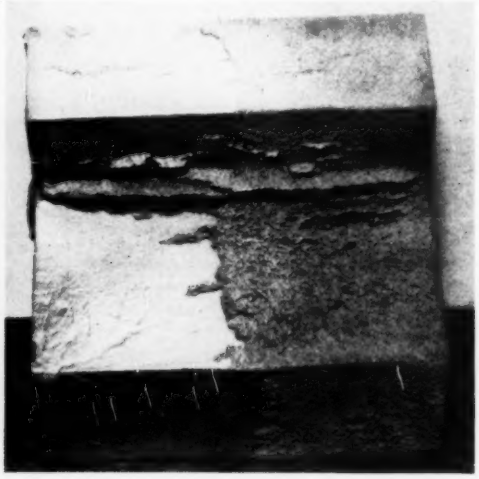


Fig. 2—The term "burn-on" is used when the penetrated layer is less than $\frac{1}{16}$ in., as in this cored section.

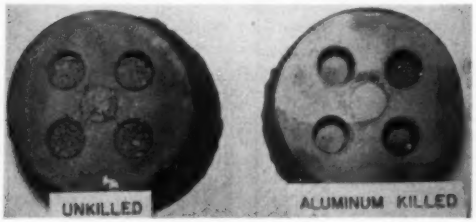
Fig. 3—Fins (veining) on the surface of this phosphor-bronze casting are associated with metal penetration (right), and occur without penetration (left).[1]



Further work on metal penetration in green, dry, and oil sand cores, using the tentative standard test procedure (AMERICAN FOUNDRYMAN, March, 1951, p. 32), is described in this paper. A progress report of the work on green sand cores will be presented at the 55th A.F.S. Annual Meeting in Buffalo, Apr. 23-26, 1951.

Fig. 4 (right)—Test casting which was developed for metal penetration investigation.

Fig. 5 (below)—Gassy metal caused penetration in unkilled steel casting (left). Killed steel (right) had no penetration. The cores were the same in both castings.



(4) Size of the voids between the sand grains.

(5) Pressure across the mold-metal interface.

(6) Chemical reactions which may occur at the mold-metal interface, and formation of slag barriers.

(7) Expansion characteristics of the surface sand grains, i.e., the tendency of heated sand grains at the surface to expand and shear from the adjacent layer.

The most desirable method for evaluating the effects of different variables connected with the surface finish of castings is to use a casting of standard shape and dimensions. Figure 4 shows the casting which was developed at the Mines Branch for penetration work. This casting weighs 45 lbs, is 5½ in. in diameter across the bottom, and 5 in. high. Four cores, each 1⅛ in. in diameter by 2 in. in height, project 1¾ in. into the bottom of the casting.

In using this casting it was extremely difficult to get metal penetration (over 1/16 in.).

In order to produce metal penetration readily with the 5-in. casting, gassy steel had to be used. Figure 5 shows this effect. The same four cores were used in each casting. Unkilled steel, which is gassy, resulted in penetration for all the cores, whereas with aluminum killed steel (which is not gassy), none penetrated.

The ease with which gassy steel causes metal penetration has been duplicated with gassy bronze. Other investigators[2] have found that when they cast gassy bronze it was very difficult to prevent metal penetration. So here we have a metal condition, namely high gas content, which can cause metal penetration. Foundrymen producing steel, bronze and other copper alloys should not neglect the possibility of gassy metal if difficulty is encountered with metal penetration, especially in small castings.

With the casting shown in Fig. 4 it was found that burn-on could be obtained by using very hot metal. It was not possible, however, to produce penetration much in excess of 1/16 in. by using fully killed steel, even at pouring temperatures of 3170F.

Figure 6 shows the results which Lillieqvist[3] obtained qualitatively on a 12-lb casting by varying the pouring temperature. A difference of 30F in pouring temperature from 2840 to 2870F was enough to change a smooth surface to a rough surface (probably burn-on according to our definition).

Although pouring temperature is most important in studying burn-on or thin layers of sand adherence on small castings, it could not be considered as the

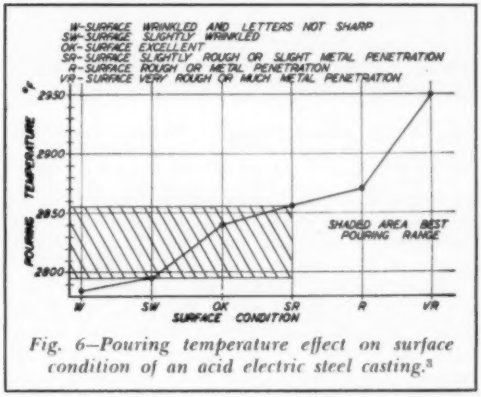


Fig. 6—Pouring temperature effect on surface condition of an acid electric steel casting.[3]

Fig. 7 (right)—Three test castings were poured to determine effect of pressure on metal penetration.

Fig. 8 (below)—Bottom view of test castings shown in Fig. 7. Left to right—30 in; 17 in.; 5 in. White marks indicate core numbers.

Fig. 9—Effect of metal head on penetration in gray iron castings poured at 2475F, using oil sand cores.

only cause. It is difficult to produce thicker layers of metal penetration merely by increasing the pouring temperature. There must be other factors involved since severe penetration is encountered in the foundry.

Pressure was considered as one possible factor since in actual practice larger castings are most susceptible to metal penetration, and larger castings having higher heads can have greater pressures at the metal-mold interface. Furthermore, gassy metal produced severe penetration on a relatively small casting. This could possibly be due to high internal pressure created by the gas coming out of solution as the temperature of the metal dropped.

In order to determine the effect of increased pressure on metal penetration, three castings were poured, 5 in., 7 in., and 30 in. in height. Figure 7 shows a side view of these three castings, and Fig. 8 a bottom view.

The order of the castings are similar from left to right in both pictures. The same four cores were used in each casting. For example, No. 1 core is exactly the same in each casting, No. 2 mix is different from No. 1 mix, but No. 2 in the 5-in. is the same as No. 2 in the 17- and 30-in. castings, and so on. All were poured from the same heat at a temperature of 2950F.

It will be observed that for No. 1 core the 5-in. and 17-in. castings were satisfactory. The 30-in. casting shows heavy veining.

Core No. 2 of the 5-inch casting shows no penetration: the 17- and 30-in. castings are completely penetrated.

In core No. 3 no penetration is shown with the 5- and 17-in. castings, but the No. 3 core of the same mix-

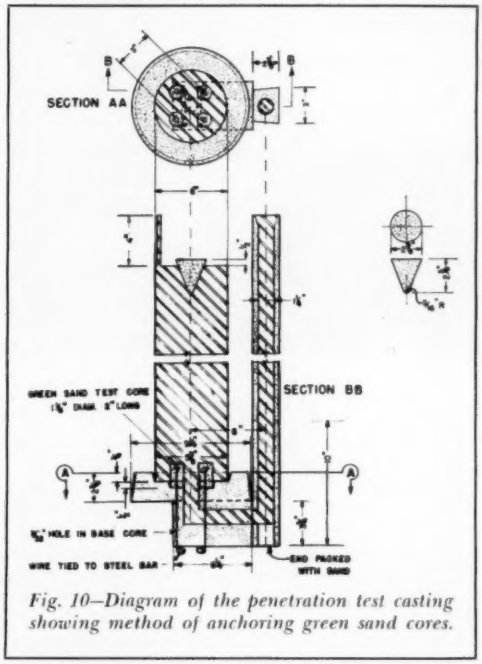


Fig. 10—Diagram of the penetration test casting showing method of anchoring green sand cores.

Fig. 11—Effect of silica flour core additions on penetration in 30 and 50 in. test castings.

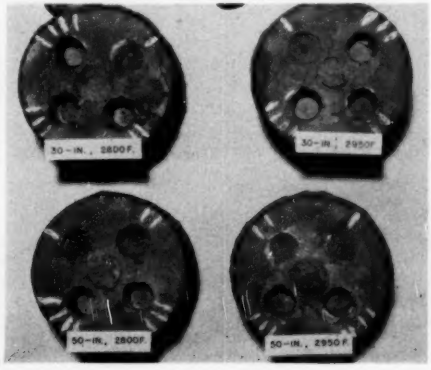
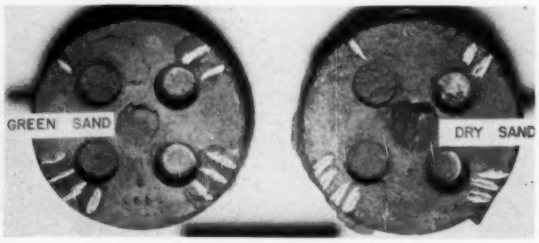


Fig. 12—Silica flour additions to green and dry sand core mixtures used in 36-in. test castings poured at 2850F affect the degree of penetration. Core No. 1, 10% silica flour; No. 2, 25%; No. 3, 50%; No. 4, 10% silica flour and 1% iron oxide.



ture in the 30-in. casting shows complete penetration.

Core No. 4 is made of serpentine rather than silica sand. Serpentine was being tested as a foundry sand and it was tried for cores in these experiments.

This test has been duplicated with iron, and the results are shown in Fig. 9. It is shown that increasing the pressure caused an increase in penetration when coarse sand was used (No. 1 and No. 3 cores). Increasing the height of the casting or the metallostatic pressure caused the metal to penetrate when all other conditions were kept reasonably constant. A test method is therefore available for metal penetration. By using short heads the effects which will be produced on small castings (burn-on) can be obtained. Higher heads simulate conditions produced in larger castings. Furthermore, by increasing the height of the casting the severity of the test is increased. The height at which a certain set of conditions produces metal penetration is the determining factor whether those conditions are good or bad insofar as metal penetration is concerned.

Figure 10 illustrates how the casting is used for green sand or dry sand cores. In order to prevent the cores from floating a wire, folded in two with a loop formed at the top, is rammed into the core. Holes are made in the bottom core to allow the wires to pass through. They are then tied to steel rods. This is unnecessary for the oil sand cores, as paste is used to anchor the cores.

Table 1 shows the effect of pouring temperature on a series of oil sand cores having No. 57 New Jersey sand as a base with 1 per cent cereal and 1 per cent linseed oil. Varying amounts of silica flour were used. Core No. 1B was 100 per cent No. 57 sand and no silica flour. With a 30-in. head this core was badly

Fig. 13—This group of test castings shows the effects of metal head and pouring temperature on penetration in green sand cores. The top row shows 5-in. castings poured at 2800; 3050; and 3100F. Center row is 24-in. castings poured at 2800; 3000; and 3050F. Bottom row, 30-in. castings poured at 2800; 2900; and 2950F.

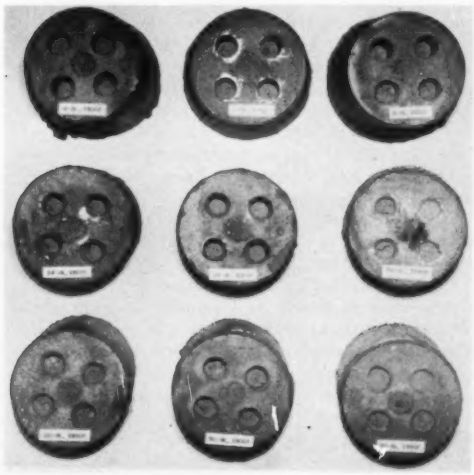


Fig. 14—Effect of 2% silica flour additions on penetration in oil sand cores, washed and unwashed, with 15 in. test casting.

TABLE I—EFFECT OF POURING TEMPERATURE
(30-in. Casting, series B)

Core No.	Pouring Temperature, F		
	2800	2950	3080
1B	penetrated ⅞ of core	penetrated ⅞ of core	penetrated ⅞ of core
2B	severe burn-on	severe burn-on	penetrated ⅛ in.
3B	slight burn-on, veining	slight burn-on, veining	severe burn-on
4B	no penetration	no penetration	burn-on

penetrated at all temperatures. No. 2B core had a 25 per cent silica flour addition. Penetration increased at 3080F. No. 3B had 50 per cent silica flour. There was a slight increase in burn-on at 3080F. No. 4B core had 100 per cent silica flour. No penetration was obtained at 2800F and 2950F. At 3080F some burn-on was produced.

Increasing the temperature from 2950F to 3080F had an effect on all cores, but that effect was somewhat decreased with increasing silica flour additions. The effects of silica flour additions are more clearly demonstrated in Figs. 11 and 12.

Figure 11 shows the same four cores (the silica flour series) poured into 30-in. and 50-in. castings at 2800F and 2950F. It will be observed that the No. 1 core, having no silica flour, penetrated badly in all cases. The No. 2 core—the 30-in. casting poured at 2800F and 2950F—produced severe burn-on. However, by increasing the height to 50 in., the 25 per cent silica flour core penetrated half way at 2800F and three-quarter way at 2950F. The No. 3 core—50 per cent silica flour—showed some veining and burn-on at 2800F and 2950F at 30 in. The 50-in. casting, when poured at 2800F, showed ⅛ in. penetration on the inside wall, and at 2950F ⅜-in. on the inside wall. The No. 4 core, which was 100 per cent silica flour, showed no penetration at 50 in. at either 2800F or 2950F pouring temperatures.

A beneficial effect is produced by using silica flour additions in steel oil sand cores. As the silica flour was increased to 100 per cent no penetration was produced even for a height of 50 in.

Figure 12 illustrates the effect of silica flour additions on green sand and dry sand cores. For green sand 25 and 50 per cent silica flour additions produce very good results (Nos. 2 and 3). For dry sand the 50 per cent silica flour gives excellent results, whereas the 25 per cent addition is not quite as good.

Tests on oil sand cores showed no significant differ-

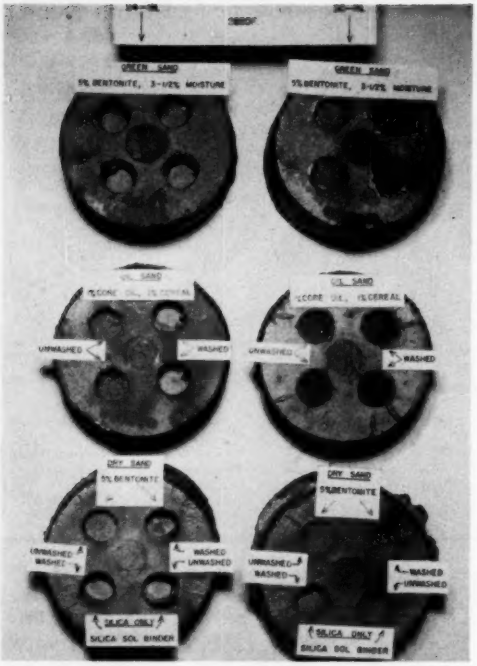


Fig. 15—Tests were made on 24 and 30 in. test castings poured at 2850F for green, oil, and dry sand cores.

ence in penetration effects when a wide or narrow screen distribution sand of the same average screen size was used. For a subangular sand, however, it was found that the average fineness should be less than 0.075 mm to prevent penetration in castings with a high metal head.

Figure 13 shows the effect of metal head or pressure and temperature on green sand mixes. New Jersey No. 57 sand was used with 5 per cent western bentonite and 3½ per cent moisture. The last vertical row shows that as the casting height is increased the pouring temperature at which complete metal penetration is obtained is lowered. The 5-in. casting only shows burn-on at 3100F; the 24-in. casting is completely penetrated at 3050F; and the 30-in. casting is completely penetrated at 2950F.

For the same pouring temperature of 2800F (first vertical row, Fig. 13), increasing the height of the casting increased the metal penetration. The 5-in. casting is not penetrated; the 24-in. casting has about 1/16 in. penetration; and the 30-in. casting has ½ in. of penetrated metal.

Within the temperature range of 2800-3100F, and the pressure range obtained between heights of 5 to 30 in., it would appear that pressure is the more potent factor causing metal penetration. The 5-in. casting must be poured at 3100F to produce burn-on, whereas at 2800F increasing the height of the casting from 5 to 30 in. is enough to cause ½ in. penetration.

Figure 14 shows the effect of 2 per cent wood flour additions to oil sand cores both in the washed (silica flour wash) and the unwashed condition. With a 30-in. casting all cores penetrated completely (Fig. 14 shows a 15-in. casting). Here wood flour produced a definite improvement in the washed condition by preventing veining and penetration. Cores 2C and 4C used in this casting produced a good surface. The unwashed wood flour core was penetrated about 3/16 in. The No. 1C core was New Jersey No. 57 sand, and it veined badly when washed. With medium metal heads, washed wood flour cores are beneficial in preventing both veining and penetration.

Figure 15 shows the results of a series of tests on green sand, oil sand, dry sand and dry sand with a silica sol binder. Some of the cores were washed with a silica flour wash. This picture clearly illustrates the test method reported here. It will be observed that on the 24-in. castings there is some penetration along the side walls with the green sand cores. The 30-in. castings, with the same cores and at the same pouring temperatures, produced worse penetration.

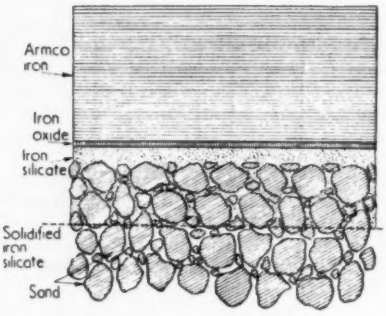


Fig. 16—Schematic diagram showing how slag barrier formation prevents penetration.[4]

The washed oil sand cores merely show veining with the 24-in. casting, but penetrate completely at the 30 in. casting height.

The washed dry sand, the unwashed and washed silica sol binder cores were satisfactory at 24 in., but at 30 in. a distinction is shown between these cores. Here, only the washed silica sol core was satisfactory. Thus, by increasing the casting height the severity of the test is increased, and the effect of any variable may be evaluated.

Figure 15 again shows that for medium casting heights a properly applied wash will help counteract penetration.

A great deal of attention is being given at the present time to washes as a possible solution to the metal penetration problem. Figure 16 shows the prevention of penetration by the formation of a slag barrier (iron silicate in this case).[4] A fused layer has formed at the surface. Upon penetrating the cooler layers of the sand, it has solidified to cause complete blockage. Here, no metal penetration can occur. However, if a wash crack occurs, the metal will flow through

the opening and cause a vein on the casting surface.

The following washes have been reported by British investigators[4] to show some promise: lime-silica washes such as 25 per cent CaO, 25 SiO_2, 2 bentonite, and 48 H_2O; or 13 per cent CaO, 27.8 SiO_2, 2 bentonite, and 57 H_2O. This wash was applied in three coats, and gave good results. Other investigators have found that fused alumina, sillimanite and zircon washes were also effective. It should be pointed out that the work on washes has just started, and that further developments may be expected.

Conclusions

From the work carried out to date, the following path is indicated. None of these suggestions is a "sure-cure" since the problem has not yet been solved:

(1) Use low pouring temperatures consistent with fluidity requirements for running the casting.

(2) Ram well—but over ramming does not help.

(3) Use fine grained sands or make silica flour additions to the core mixture.

(4) Use washes which will not crack under heat shock, and a wash layer sufficiently thick to be effective. Caution should be exercised to carefully apply and dry the washes so that cracks are not formed in the wash prior to metal contact.

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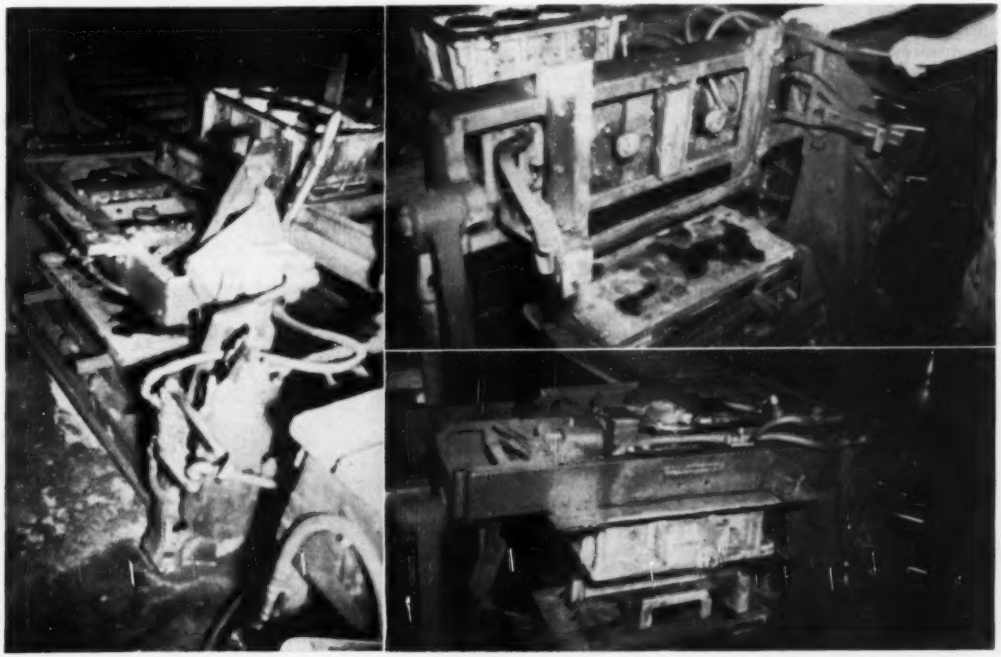
SMALL AIR RAMMERS REPLACE VIBRATORS

Core rejections on production runs became negligible after Stephen Biasco, Sorbo-Cast Corp., New Brunswick, N. J., substituted small air driven scaling tools for vibrators on a complicated core drawing job. Modifying the scaling tools to take a standard 2½ in. tamping butt, he mounted them on a core drawing machine where they mechanically rap the bottom of the box for an intricate motor block cylinder core which includes three loose pieces.

At the left in the figure below, the core box is in position on the roll conveyor ready for filling and transfer to the core drawing machine. The machine is shown tipped at the upper right to illustrate location of controls and to show the tamping butts. After ramming the core, the box is transferred to the drawing machine where a plate is clamped to it by means of clamps at each end of the machine. Rolled over, the box is rapped by the little scaling tools. The lower table then is raised to meet the core plate, clamps are released, and the table lowered as in lower right. Whole drawing operation takes less than 30 seconds. Illustration of machine inverted was made without a core to show location of loose pieces which are removed by hand after core is drawn.



ROLE OF A METALLURGICAL

This paper briefly discusses the part which a metallurgical engineer can play in the foundry industry and shows what his training and experience have been and how they can best be utilized. This is one of a series of papers presented at a Foundry Educational Foundation meeting February 15 and 16. Practical training received by most college students now entering the industry is shown in the photographs made last summer in Ford's Dearborn Foundry.

INTEREST of foundries in the Foundry Educational Foundation during recent years shows that the industry is entering upon a new era in which the number of engineering graduates employed will far exceed the number in past years. There will be a need for the services of many types of engineers with various backgrounds of training in order to fill the supervisory and other equally important positions created by retirements and by new demands on the industry for closer technical control of the castings produced.

All engineering colleges do not have identical curricula in metallurgical engineering but an analysis shows that with few exceptions they follow somewhat similar patterns. Variations may be due to the particular locality where the school is situated, for example, in the mining areas where more emphasis is placed on process metallurgy than on physical metallurgy. Slight emphasis on certain subjects may result from special interests and abilities of a particular staff member. In general, however, the training program can be divided into several major groups such as basic science, applied science, engineering, economics and administration, general cultural studies, electives and thesis.

In order to explain in more detail the nature of this training and its value in preparing men for effective work in the foundry industry, these groups of subjects will be discussed on the basis of the work covered in the five year curriculum in the engineering college at Cornell University. It can be generally assumed that the four year engineering schools will have their curricula divided in much the same manner with the total amount of time correspondingly reduced.

Basic Science: As is the case in all engineering it is necessary to first build a solid background in physics, mathematics, and chemistry before beginning the study of the applications of scientific principles to the solution of engineering problems. Nearly one third of the work of the entire five-year curriculum is devoted to these basic subjects which include (a) physics in its various branches of mechanics, wave motion, sound, heat, electricity, magnetism, physical electronics, and optics, (b) analytic geometry, calculus, and applied mathematics, and (c) inorganic, qualitative, organic, quantitative, and physical chemistry. Because of its importance to students in metallurgical engineering, over half of the time spent in these courses is devoted to chemistry.

Applied Science: In this group of courses the student begins to apply the basic scientific concepts as a stepping stone toward the engineering work later in the curriculum. The courses in this group are (a) mechanics, which includes statics, dynamics, and strength of materials, (b) materials, including the origin, manufacture, uses, properties, and testing of common metals and non-metallic materials used in engineering work, (c) thermodynamics, and (d) a short course in microscopy of industrial materials. This work covers a total of 26 credits in the curriculum of 189 credits or about 14 per cent.

Engineering: Approximately 24 per cent of the curriculum time is spent on required engineering courses. This time is divided between metallurgical engineering courses (two-thirds) and courses in other engineering departments (one-third) such as mechanical and electrical. The three courses in electrical engineering cover circuits, generators, motors, instrumentation, transformers, and electronic controls. The work in mechanical engineering includes drawing, descriptive geometry, and machine tools.

The course work in metallurgical engineering subjects is divided into several groups, namely, metallurgical calculations, unit processes, smelting and refining, metallography, physical metallurgy, heat treating, casting, welding, hot working, cold forming, metallurgical design, library use, and patents. All students must also spend one week during their fourth year on an organized plant visitation trip.

Economics and Administration: The required courses in these fields are accounting, economics, statistics, quality control, and industrial organization and management. They constitute 12 credits or about six per cent of the curriculum.

General Cultural Studies: All students are required to take 18 credits of work in: English, psychology, science in western civilization, and public speaking. This represents about 10 per cent of the total credit for the five year program.

Electives: About 21 credits (11 per cent) can be taken in almost any field of study of interest to the student. Experience indicates that students generally elect six or nine credits in metallurgical engineering

Ford's Wm. E. Goudey, general superintendent, cylinder block job, explaining pouring car operations to Emil Chirila, student, Case Institute of Technology.

ENGINEER

Peter E. Kyle
Assistant Director
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Harry E. Gravlin, center, assistant plant manager of Ford's Dearborn Iron Foundry, discusses a casting with John Alstetter, Ohio State University and Oliver Perry, University of Alabama.

and the balance in such fields as business administration, languages, labor relations, engineering law, time and motion study, or statistics. Several have chosen electives in such a way that they can get a master's degree in business administration by spending only one year at Cornell after completing the requirements for bachelor of metallurgical engineering.

The available electives at present in the field of metallurgical engineering include an advanced course in process metallurgy for those who wish to carry on their studies of smelting and refining of metals. This course is conducted as a seminar for one term and enables the class to review the current literature in a critical manner. A similar one-term advanced course in physical metallurgy is available. This course includes a limited amount of laboratory work and supervised study of the structure of metals, the effects of controlled cooling from the liquid state, thermal treatments in the solid state, and hot and cold deformation. The third in this group of electives is a two-term course in advanced foundry engineering which will be described in more detail in a later section of this paper.

Senior Project: Before graduating each student must complete a thesis or research project in order to put to practical use a considerable portion of the material he has studied. The project is chosen in the field of metallurgical engineering. It must be comprehensive and one which is likely to allow the student to draw some conclusions from his work within the allotted time. He must plan the entire project, design and help with the construction of equipment, carry out the experimental work, correlate the results, and prepare an acceptable engineering report on the entire project.

Other Activities: The various extra-curricular activities which are available at most schools are considered a very important part of the student's training in metallurgical engineering and are encouraged. The Cornell Metallurgical Society is run entirely by the students and membership is open to freshmen to encourage early participation.

Serving on the staff of the *Cornell Engineer* magazine is excellent experience either in editorial work or business management. Engineers seldom find the necessary time to serve on the board of the daily newspaper, *The Cornell Daily Sun*, but the editor-in-chief this year is one of our metallurgical engineering students and also a holder of a Foundry Educational Foundation scholarship. Athletics, dramatics, glee club, band, orchestra, and many other activities are also available for enjoyment and self development.

Most students in metallurgical engineering spend several summers working in industrial plants, usually in the vicinity of their homes. With the five-year curriculum it is possible to get four such periods although we usually recommend that at least one be used for other activities such as traveling. Foundry Educational Foundation scholarship students have been very fortunate in obtaining summer employment in foundries and this experience reflects very noticeably in their work and attitude in courses taken subsequently. They seem to realize what their studies are leading to and have a much keener interest in them.

Specific Courses in Foundry Engineering: While it is true that all of the courses a metallurgical engineer takes are an integral part of his over-all training for his professional work, it will undoubtedly be of interest to outline in somewhat more detail the courses which are focused directly on the teaching of foundry practice and engineering. At Cornell we are fortunate in being able to cover this material at three different levels throughout the five-year program.

The *elementary* coverage of the various practices used by the foundry industry is scheduled in the second year for metallurgical engineers (first year for mechanical, electrical, and engineering physics students). This work is part of a course which also includes some welding and metal forming. At this time the students are very keen to learn something about their professional field since most of their work up to that time has been in basic science. Because of their somewhat limited background it has been considered advisable to devote this first course to acquainting them with the fundamental structure of metals, how mechanical properties are measured, the simpler concepts of metal solidification, properties of foundry raw materials, and the detail of methods used in molding, pouring, cleaning and inspection of castings.

In this latter group the aim is to explain in the lecture room and demonstrate in the laboratory the mechanical features of such processes as sand, permanent mold, die, centrifugal, and precision casting,

and the common melting procedures for ferrous and non-ferrous metals. The emphasis in this course is on how things are done in the foundry. The student profits from this introductory course in several ways. For example, he has some background to help him in his summer work, he has more interest in his later courses in engineering, and he has had a chance to perform some of the operations in the laboratory.

The *intermediate* level of instruction in this subject is scheduled in the fourth year of the program and is required of mechanical and metallurgical engineers. At this time it is possible to apply the principles of the basic and applied sciences and engineering with which the student is now familiar. At this point (a) he has completed most of his work in chemistry, physics and mathematics, (b) he has had courses in materials of construction, machine shop, testing materials, mechanics, economics, and industrial organization and management, and (c) his work in metallurgical engineering has progressed to the point where he has completed metallurgical calculations, metallography, and physical metallurgy, and has started his major lecture and laboratory course in unit processes and smelting and refining. With this background it is possible to cover such subjects as requirements and behavior of mold and core materials, problems of gating and feeding, residual stresses, solidification, segregation, mechanics of centrifugal casting, casting design, tooling for casting production, materials handling, metallurgy of cupola and electric furnace melting, foundry layout, testing, and casting inspection.

Broad Advanced Study

The *advanced* course in foundry engineering is required of all Foundry Educational Foundation scholarship students and is taken by many other metallurgical and mechanical engineers who have developed an interest in the foundry industry. This course runs throughout both terms and has the intermediate level course as a prerequisite. Consequently it is taken only by students in their fifth year. The work is conducted in seminar meetings supplemented by related demonstrations and investigations in the foundry laboratory. The purpose of the seminar is to review, in the early part of the course, all of the literature on various fundamental subjects such as heat transfer in molding materials, mold-metal interface reactions, molding sand properties and testing, fluidity, solidification rates and control, hot tearing, dimensional stability, gating, and feeding.

The next major division of the subject matter consists of a series of discussions on the details of melting and treatment of ferrous and non-ferrous metals during melting. This is followed by a review of the various casting processes and a critical study of the effects of these processes on the properties of the finished castings. In order to survey some of the basic properties of cast metals and how they are obtained in the foundry the next group of meetings is devoted to discussions of particular cast parts such as machine frames, crankshafts, bearings, abrasion resisting castings, heat resistant castings, pistons, piston rings, cylinder liners, valve bodies, gears, and cylinder blocks.

At the end of these discussions and about the beginning of the second term the students are required to choose a foundry design and layout problem, make a brief market survey on the product to be made, and proceed to compile the necessary information for the choice of equipment, raw materials, and processes to be used. During this same period there are seminars devoted to discussions of molding equipment, melting units, patterns, material storage and handling, dust control, ventilation, cleaning, quality control, costs, and general foundry layout. At the end of the course each student discusses his foundry problem before the class and finally submits for credit the complete layout and design accompanied by a report showing the methods of analysis used in the problem and complete equipment specifications.

Within the industry there are many activities requiring the services of well-trained engineers. Certain of these activities can perhaps be handled best by metallurgical engineers but adequately by engineers trained in one of the other fields. Conversely there are other activities where mechanical, administrative or industrial engineers might seem to be better trained to serve although metallurgical engineers could perform these functions adequately. Because of this situation it is difficult to pick a group of the various job classifications and say that metallurgical engineers can fill them better than others. The following discussion, therefore, must be considered in the light of the situation where all well-trained engineers can be further trained by industry for many responsible positions regardless of the specific field in which they studied while in college.

Another important issue that should be made clear at this point is that neither educators nor students believe that graduation implies full and complete training for any specific position in industry. In seeking maximum opportunities and starting salaries for their students, educators may create the impression that their protegés are ready to assume the vice-president's duties and students may do likewise without realizing it. Actually neither the student nor the educator feels that this is possible. Everyone agrees that the trainee classification in the foundry industry Job and Positions Descriptions* is the starting point regardless of the startling array of courses taken in the university.

Because of his training, the metallurgical engineer, would undoubtedly do an excellent job in any of the positions leading up to and including the position of chief metallurgist or chief metallurgical engineer in connection with plant operations and castings manufacture. Some engineers would prefer this to other duties, which they might perform equally well, because of the activity level and the challenging nature of the work. Their chances of success can often be noted by reactions while studying the basic courses in smelting and refining and later on by work in the foundry courses.

One of our June graduating metallurgical engineers is decidedly of this type. Because of some summer experiences and based on his interests and comments he has quite definitely established in his own mind that his chief aim is to get a job related to electric furnace melting. He loves it and all of the hard work and headaches which often accompany such an assign-

* Compiled as of October 1, 1949, by the Foundry Educational Foundation.

ment. There are, of course, other functions of the metallurgical engineer in castings manufacture which are attractive and for which he has adequate preliminary training. Such functions are supervision of operations, quality control, and metallurgical testing and inspection.

The research and development department of a foundry offer many useful positions for a graduate metallurgical engineer. After he has spent adequate time in the plant to become familiar with company products and operations he can be of invaluable assistance in the development department by working on improvement of processes and products. In working out these improvements, research projects will undoubtedly be needed where his training and experience will prove extremely valuable. In searching out

Oliver Perry and John Alstetter follow crankshaft casting production sequence with James Garrett, the general superintendent of Ford's Dearborn Iron Foundry.

new fields for cast products and new cast products to meet the needs of new engineering devices, his knowledge of possibilities and limitations can be used. Where an analysis of products made by competitive processes is needed, his studies of welding, hot working, and cold forming will be very valuable, as will his basic training in heat treating and metal finishing.

Where sales competition is keen it is becoming increasingly important to sell the customer some engineering as well as the product. Sales, particularly in new fields, are much more numerous where the foundry salesman is able to discuss design, properties, metallurgical structures and heat treatment with the customer, and in some instances it is absolutely necessary that this be done. Such sales activity is done best by people who have some engineering training. Many of our metallurgical engineers although well-trained in metallurgical engineering have shown considerable interest in market analysis and business courses.

In many large companies, the satisfactory purchasing of equipment, raw materials and supplies is so extensive that a metallurgical engineer can be of invaluable assistance in that department. Of particular value would be his knowledge of material sources and their quality, an understanding of the operations and processes where they would be used and their suitability for those uses, and his ability to evaluate new materials and guide the laboratory in a test program to assist in this evaluation.

In discussing only a few typical activities within the industry which can be actively pursued by a metallurgical engineering graduate, the intention was to show first the positions which might be filled during the earlier years of association with a company. Naturally, the abilities and desires of the individual will determine whether or not these are to be the stopping points in his career. Many of the positions discussed are very satisfactory and can continue to offer challenges during ing an entire working lifetime. In many cases, however, these positions serve the purpose of adding to the experience of the individual who is capable and aspires to executive level assignments. Metallurgical engineers who have developed such capabilities and have aspirations as a result of their university training and industrial accomplishments can and do take over responsibilities at this higher level in competition with other engineers and men with business training.

Can Fill Executive Posts

Perhaps the executive positions most commonly filled by metallugical engineers are chief engineer, works manager, director of research and development, and general manager, although it is quite possible they could be equally successful in sales or purchasing depending on the nature of the foundry activity.

The various job and position classifications which have been discussed are commonly made in large companies and where there are large staffs available so that each separate function will be carried on by one or more individuals. In smaller companies, many duties are combined and assigned to a much smaller staff. The characteristic training of a metallurgical engineer includes several other fields of interest aside from metallurgy. This is advantageous to these smaller foundry organizations because by carefully choosing the young graduate engineer they can acquire various combinations of talent and interest. One of our June graduating engineers has just accepted a position of this nature where his duties, after suitable in-plant training, will be numerous as assistant to the president.

One of the most important points to emphasize when discussing the problem of the absorption of engineers into any industry, is that when a student graduates he has had a basic training in science and engineering and has only a certain potential value to the industry. To realize that value the industry must continue with the training program along somewhat different lines. In general the success of this continued training will depend on several factors, namely, the quality of the student's university training in fundamentals, his inherent abilities to learn and apply these fundamentals, opportunities offered by industry to apply these fundamentals to their particular processes, and the degree of cooperation between the student and the people with whom he has to work.

If proper attention is paid to all of these factors, it is certain that metallurgical engineers will find their place in the foundry industry and as a group will be of invaluable assistance in helping to keep the industry strong and permit an expansion of activities through technical developments.

FOUNDRYMEN AND FOUNDRY EDUCATORS MEET FOR 1951 ANNUAL FEF CONFERENCE

ANNUAL CONFERENCE of foundry educators and industrial and foundry society representatives sponsored by the Foundry Educational Education was held in Cleveland February 15 and 16. Designed to promote exchange of ideas among the 13 FEF schools and others invited to participate, the meeting featured papers on the role of various types of engineering graduates in the foundry industry, teaching of casting design, course outlines, and recommendations of the Technical Advisory and the University Advisory Committees of FEF. Several of the papers will appear in AMERICAN FOUNDRYMAN. In charge of the conference was FEF Executive Director George K. Dreher.

Those at the two-day meeting shown in the picture, are: Front row, left to right—Mr. Dreher; James H. Lansing, Malleable Founders' Society; G. J. Behrendt, Eastern Malleable Iron Co.; F. J. Walls, International Nickel Co.; Frank G. Steinebach, Penton Publishing Co.; Claude B. Schneible, Claude B. Schneible Co.; A. J. Tuscany, Foundry Equipment Manufacturers' Association; Arthur Jackson, Lake City Malleable Iron Co.; Dan T. Jones, Alabama Polytechnic Institute; C. O. Burgess, Gray Iron Founders' Society; C. W. Briggs, Steel Founders' Society of America; Howard F. Taylor, Massachusetts Institute of Technology; and K. H. Donaldson, Case Institute of Technology.

Second row—D. S. Eppelsheimer, Missouri School of Mines; A. J. Grindle, Whiting Corp.; Lester Merrit, Ohio State University; L. C. Price, Michigan State College; Arthur Beduhn, Cuyahoga County Committee of Selective Service Board Chairmen; Otto Zmeskal, Illinois Institute of Technology; R. E. Kennedy, University of Illinois (Navy Pier); Wylie R. Childs, Lafayette College; Robert Spurgin III, Swayne, Robinson & Co.; Herbert F. Scobie, AMERICAN FOUNDRYMAN; Willis Chandler, Northwestern Technological Institute; Clyde E. McQuiston, Ohio State University; J. L. Leach, University of Illinois (Champaign-Urbana).

Third row—E. F. Stolpe, Carbon Malleable Castings Co.; A.F.S. National Vice-President Walter L. Seelbach, Superior Foundry Co.; R. W. Heine, University of Wisconsin; P. E. Kyle, Cornell University; J. Elliott Janney, Rohrer, Hibler & Replogle; H. A. Bolz, Purdue University; Lee S. Whitson, University of Minnesota; C. F. Walton, Case Institute of Technology; Carl H. Casberg and Harry Czyzewski, University of Illinois (Champaign-Urbana); C. T. Marek, Purdue University; Paul Hughes and Melvin Adams, MIT.

Back row—Carl Duncan, University of Kentucky; Frank Traviglia, Jr., FEF; C. E. Wenninger, University of Kentucky; D. C. Williams, Ohio State University; L. F. Mondolfo, Illinois Institute of Technology; H. V. White, Virginia Polytechnic Institute; Donald Crews, University of Cincinnati; B. L. Dutton, Tennessee A & I; C. E. Bullinger, Pennsylvania State College; N. J. Stickney, Sand Products Co.; C. W. Morisette, Pennsylvania State College; C. E. Wright, University of Alabama; C. C. Sigerfoos, Michigan State College; G. J. Barker, University of Wisconsin; and Minard F. Rose, Tri-State College.

Reference Linseed Oil Developed

REFERENCE LINSEED OIL for core research is now available for fundamental investigations of core baking. Prepared by Archer-Daniels-Midland Co. (Werner G. Smith Co. Div.), in cooperation with the A.F.S. Sand Division's Strength Sub-Committee the oil is an alkali-refined product of selected flax; no drier has been added. Specifications of the oil are:

Specific Gravity	0.931-0.935
Saponification Value	190-194
Iodine Number	178-182
Acid Number	2-4
Color (Gardner) Clear, brilliant straw color at room temperature	5 max.
Viscosity (Gardner-Holt)	A_1—A
Moisture	0.1%
Ash	0.01%

The oil is available immediately in five gallon lots.

The Core Strength group is a sub-committee of the Core Test Committee headed by Elmer C. Zirzow, Deere & Co., Moline, Ill. Members of the Core Strength Sub-Committee are: *chairman*, Harry W. Dietert, Harry W. Dietert Co., Detroit; *vice-chairman*, O. Jay Myers, Archer-Daniels-Midland Co. (Werner G. Smith Co. Div.), Minneapolis; *secretary*, Robert D. Walter, Archer-Daniels-Midland Co. (Werner G. Smith Co. Div.), Cleve'and; H. L. Campbell, Oak Park, Ill.; Stanley H. Davis, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; A. E. DeClercq, Lauhoff Grain Co., Detroit; J. A. Mescher, Unitcast Corp., Toledo; and Robert E. Morey, Naval Research Laboratory, Washington, D. C.

WHAT'S AHEAD FOR NON-FERROUS FOUNDRIES IN DEFENSE WORK?

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IN EXAMINING THEIR ROLE in the defense program, non-ferrous foundries are thinking about the type of work to be expected of them, the alloys, use of substitute materials, and new alloys, materials and methods to be developed.

Aluminum foundrymen can expect a demand for their castings greater than the World War II requirements. Engineers have learned to make greater use of the excellent properties of aluminum such as high strength-weight ratio, corrosion resistance, machinability, and ease of fabrication. Our military forces today stress mobility, and aluminum alloy castings have proved indispensable for this purpose.

Aluminum castings, in addition to use in aircraft, will be used in tank engines, weapon carriers, jeeps, gun mounts and carriages, various types of airborne equipment, guided missiles, radar and other instruments, and naval equipment where weight is a critical factor. Such castings are generally more complicated, requiring more core work, are subject to more stringent specifications, and require a better foundry technique than commercial work.

Copper alloy castings will probably be used less than in World War II partly due to the copper shortage, but also because its use in some cases will be supplanted by other metals, particularly aluminum. Copper alloy castings will be used for electrical purposes, bearings, gears, valves, pumps, and corrosion-resistant parts. Again, castings in these alloys will be more complicated and requirements more stringent.

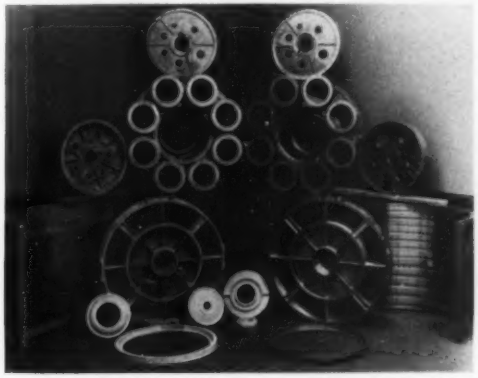
Al-Si Alloys Widely Used

Great quantities of the aluminum-silicon casting alloys will be used because of their superior castability, good strength and excellent corrosion resistance. Alloy No. 355 (SAE 322), of the composition 5 per cent silicon, 1.2 copper, 0.5 magnesium, plus desired grain refining elements, and balance aluminum, will be the "work-horse" alloy used for crankcases, liquid-cooled cylinder heads, housings, etc.; in short, where strong, sound, leak-proof castings are required.

Alloy No. 356 (SAE 323), composition 7 per cent silicon, 0.3 magnesium, and balance aluminum, will be used for complicated leak-proof castings of superior corrosion resistance and/or higher ductility such as naval castings, complicated valves, pressure equipment, leak-proof housings, etc. A down-graded alloy of this general type, alloy No. 319 (SAE 326), composition 3.5 per cent copper, 6.3 silicon, balance aluminum, will be specified wherever possible to substitute for alloys No. 355 or 356.

Great quantities of air-cooled cylinder head castings are now being made from alloy No. 142 (SAE 39), composition 4 per cent copper, 1.5 magnesium, 2 nickel, plus grain refiners, balance aluminum. These castings will be used on air-cooled engines for tanks, planes, and helicopters because of this alloy's remarkable strength at elevated temperatures.

The aluminum alloys No. 355, 356, 319 and 142 generally must be heat treated before use to achieve the highest physical properties required but, when heat-treat equipment is not available, certain aluminum-zinc alloys may be specified for castings requiring high strength at ordinary temperatures plus considerable ductility. These alloys are of the No. 40E type (SAE 310), 5.5 per cent zinc, 0.6 magnesium, 0.5 chromium, 0.2 titanium, and balance aluminum.



The large housings and plates in this group of jet engine castings were cast in aluminum alloy No. 355 (SAE 322). The small rings shown at the bottom of photograph are of a special Al-Sn-Ni bearing alloy.

Unfortunately, they have some disadvantages in that they are heavier than some of the other aluminum alloys, have poorer castability than the aluminum-silicon alloys, in certain corrosive atmospheres fail rapidly by stress corrosion, and are poison to aluminum-silicon alloys which they can contaminate when both types of alloys are melted in the same foundry.

The writer believes that there will be an increase in the use of aluminum No. 218 type alloy, composition 8 per cent magnesium and balance aluminum, and No. 220T4 (SAE 324), composition 10 per cent magnesium and balance aluminum. These alloys will be used for castings requiring great strength and ductility such as gun mounts, housings, etc., in spite of poor casting properties of these alloys and the use of high-grade aluminum in their composition.

In the case of the copper alloys the so-called silicon

NOTE: This paper was presented before the Non-Ferrous Section of the A.F.S. Central New York Chapter, Jan. 12, 1951.

bronzes will undoubtedly substitute for tin bronzes in order to conserve tin wherever possible. However, they have disadvantages, mainly in their tendency to shrink-crack and the danger of contamination with leaded bronzes. Therefore, extra care must be used in handling these alloys to minimize these dangers.

Aluminum bronzes and manganese bronzes will be used in greater proportion in defense equipment because of their greater strength-weight characteristics and corrosion resistance, particularly in marine applications. The use of tin and nickel bronzes will be greatly reduced in order to conserve these strategic metals. The use of high conductivity copper will continue due to the vast amount of electrical and electronic equipment used in defense.

Regarding shortages of metal, it is now known that all metals, material, and labor will be allocated, with defense taking priority. Eventually practically all aluminum and copper will go to defense. Alloys and alloy

Large castings, such as the 3000-lb bronze casting shown, require large quantities of critical materials.

substitutions have been discussed, but shortages of materials and use of substitute materials must be considered. Core oil shortages may require conversion to synthetic binders such as urea and phenolic resins.

These materials have already proved advantageous in many non-ferrous foundries during and since World War II, particularly in faster baking and better collapsibility. However, these binders generally need cereal binders to supplement their strength. Shortages of cereals can easily occur, which would restrict the use of resin binders. Good graphite for crucibles may become short, causing higher melting costs. Oil shortages may necessitate the use of higher sulphur fuels, with detrimental effects on casting quality unless certain fluxing procedures are used.

Soda ash may be used as a flux with copper alloys to reduce sulphur content due to absorption from fuel. Also, copper-nickel alloys which are particularly susceptible to sulphur pick-up may be improved by the incorporation of manganese in these alloys. Aluminum alloys should be thoroughly degassed by the use of chlorine, nitrogen or chlorine-fluorine compounds.

The most serious shortage affecting the foundryman will be that of skilled manpower. It will require a seriously planned training program to provide the necessary foundry help. Because of the great amount of labor going into a casting, a casting is generally only as good as the training of the men who made it. A poorly trained melter may cause terrific losses.

New aluminum alloys probably will be developed, particularly for specific defense purposes, or may be specified to make use of certain scrap composition, etc. Aluminum, for example, is a good bearing material, and bearings made from No. 750 alloy type, containing 1 per cent copper, 1 nickel, 6.5 tin, and balance aluminum, can be used as replacements for copper alloy bearings, reducing both weight and the use of copper and tin. Aluminum foundries may have more competition from magnesium foundries because new magnesium alloys, with better physical and casting properties, have come into use recently. These are the magnesium-rare earth-zirconium alloys.

There do not appear to be any startling developments in the copper alloy field. Some work has been done in the modification of existing alloys by partial replacement of tin with nickel but the present serious nickel shortage has complicated this situation.

No really significant new non-ferrous foundry materials have been introduced since World War II. Undoubtedly, the press of the defense program, shortages, and the necessity of using substitutes will result in the development of new materials.

Conclusion

During the past war more extensive use was made of the investment, centrifugal, and permanent mold casting processes. More recently, the shell molding process has been introduced. It is to be expected that additional new processes and methods will emerge and fall into their proper niche in the foundry industry. Among these new processes and methods which will be applied more widely to non-ferrous defense castings are shell molding, statistical quality control, nondestructive testing, electronic core baking, etc.

In the present emergency the foundries will have to produce sounder and more dimensionally accurate castings more efficiently and faster than ever before. To do this they will have to use all of the old and many of the new methods at their command, and devise still other new methods. There is no better place to learn the old and proven foundry techniques and new ideas and methods than in the publications of the American Foundrymen's Society, including AMERICAN FOUNDRYMAN, other foundry literature, and the various local, regional, and national meetings sponsored by the American Foundrymen's Society.

New, Smaller A.F.S. Pins Available

Contrasted here in actual sizes are the old A.F.A. pin and the new, smaller A.F.S. pin, reduced in size by popular demand of members of the Society. The new ⅝ in. diameter pins will be traded for the old A.F.A. pins at no extra cost or are available at $1 each from A.F.S. National Office, 616 S. Michigan, Chicago 5.

WHO'S WHO

E. F. Kurzinski

E. F. Kurzinski, author of *"Degas Molten Metals with Inert Gas,"* Page 78, is development engineer for Linde Air Products Co., Division of Union Carbide & Carbon Corp. . . . A graduate in mechanical engineering from Rutgers University in 1942, Mr. Kurzinski has spent his entire career, with the exception of three years as a Naval Lieutenant in World War II, with Linde . . . He has been a frequent contributor to the technical and trade press on such subjects as degassing of metals and welding practices.

W. A. Mader

W. A. Mader, author of *"What's Ahead for Non-Ferrous Foundries in Defense Work?"*, on Page 105, is a graduate of Pennsylvania State College and has been employed as metallurgist for several prominent foundry organizations, airplane manufacturers and by Frankford Arsenal . . . For the last six years he has been chief metallurgist and director of laboratories for Oberdorfer Foundries, Inc., Syracuse, N. Y., and during this period has published several articles in the technical press.

A. E. Murton

A. E. Murton, co-author of *"Core Oil Evaluation Method,"* Page 85, is metallurgist for the Mines and Geology Branch of the Canadian Department of Mines and Resources . . . A graduate of Colorado School of Mines in 1943, he worked for Consolidated Mining & Smelting Co., Trail, B. C., before joining the Bureau of Mines in 1944, where he is working in the experimental foundry.

K. E. Robinson

K. E. Robinson, co-author with R. S. McClintock, Jr., of *"Modern Foundry Methods—Aids in Selection of Proper Foundry Ventilation,"* Page 90, is consulting ventilation supervisor to the Michigan Department of Health's Division of Industrial Health . . . He is author of several articles on air pollution problems and is a member of an American Society of Heating & Ventilating Engineers committee whose book on that subject is currently going to press . . . Mr. Robinson has been a frequent speaker at meetings of A.F.S. and other technical societies.

S. L. Gertsman

S. L. Gertsman, author of *"Evaluate Metal Penetration Variables,"* Page 44, is well-known to A.F.S. members for his work on the Mold Surface Committee . . . A native of Canada, he attended Queen's University, Kingston, Ont., graduating with honors in metallurgy, and since that time, except for a brief period with Hull Iron & Steel Foundries, Hull, Que., has been employed by the Canadian Government . . . Author of many articles on metallurgy, he is today physical metallurgist for the Canadian Bureau of Mines.

B. Richardson

B. Richardson, co-author with H. H. Fairfield and A. E. Murton of *"Core Oil Evaluation Method,"* Page 85, is metallurgical research engineer for the Steel Castings Institute of Canada, Toronto . . . A graduate of the University of Toronto, he has been employed by Canadian Allis-Chalmers Co., Ltd., and by Aluminum Co. of Canada and Canadian General Electric Co., Ltd., prior to assuming his present position in 1948.

R. S. McClintock, Jr.

R. S. McClintock, Jr., co-author of *"Modern Foundry Methods—Aids in Selecting Proper Foundry Ventilation,"* Page 90, is district engineer for the Division of Industrial Health, Michigan Department of Health . . . He has been with the Department since 1946, when he was discharged as a Captain after active service in the Pacific Theater in World War II . . . Like his co-author, K. E. Robinson, he is author of several articles and has spoken frequently before technical groups on air pollution problems.

H. H. Fairfield

H. H. Fairfield, co-author of *"Core Oil Evaluation Method,"* Page 85, is chief metallurgist for Wm. Kennedy & Sons, Ltd., Owen Sound, Ont. . . . Mr. Fairfield began his foundry career as a cooperative student with General Motors Corp., St. Catherine's Ont., becoming assistant metallurgist there and attending GMC's Institute of Technology at Flint, Mich. . . . He has since been metallurgist for the Canadian Bureau of Mines and foundry consultant to the Harry W. Dietert Co., Detroit, prior to his present position.

P. E. Kyle

P. E. Kyle, author of *"Role of a Metallurgical Engineer,"* Page 100, is professor of mechanical engineering at his alma mater, Cornell University . . . Professor Kyle has for several years been vice-chairman of the Society's Sand Division and has been prominent in the A.F.S. Educational Division . . . Since serving his apprenticeship in 1927 with Scott & Williams, Inc., Lakeport, N. H., he has been with Westinghouse Corp. and has instructed in mechanical engineering at Lehigh University, Massachusetts Institute of Technology, and now Cornell University . . . He is now at work on a college foundry text under the auspices of the A.F.S. Educational Division.

(Continued on next page)

WHO'S WHO

(Continued from Preceding Page)

R. C. Cornell

Robert C. Cornell, author of *"Die Casting Magnesium Alloys,"* Page 75, is vice-president of Litemetal Diecast, Inc., Jackson, Mich. . . . A graduate of Fenn College, Cleveland, he has served, successively, as heat treat inspector, operating apprentice, metallurgist, and research metallurgist in midwestern foundries prior to assuming his present position in 1946 . . . He is a member of the SAE Aircraft Wheel and Brake Committee.

BOOK REVIEWS

Personnel Handbook

Personnel Handbook, edited by John F. Mee, 1167 pp., illustrated with 262 forms, diagrams and check lists, 23-page index. Published by Ronald Press Co., 15 East 26th St., New York 10. $10. (1951).

Key to any situation involving personnel management and industrial relations is to be found in this volume, which includes rules, policies and tested techniques for maintaining smooth-working management-employee relationships, improving cooperation and avoiding friction and misunderstandings. Data is compiled from practical management experience, surveys, business journals, special articles and standard works on the subjects. Triple-indexed, subjects include cost control, job analysis and evaluation, wage administration, personnel tests, merit rating, medical and financial services, contract negotiations, industrial and government relations, human relations, morale, training, education, public relations, etc.

Gray Iron Coatings

Metallic and Non-Metallic Coatings for Gray Iron, by Charles O. Burgess, Technical Director, Gray Iron Founders' Society, 76 pp., illustrated with photographs, 9-page bibliography. Published by Gray Iron Founders' Society, Inc., 210 National City—East 6th Bldg., Cleveland. Price to GIFS members $1.25. Non-Members, $1.75. (1951).

This timely new technical manual covers in detail the practice of surface coating gray iron castings and is designed to facilitate product economies and conservation of alloys now in short supply and that are subject to rigid control by the Government.

Described in the manual are practical methods of applying all known types of coatings to gray iron, making it of particular value to engineers and designers interested in improving castings appearance to obtain wider consumer acceptance and serviceability. Manual is a preprint of Chapter VII of the forthcoming *Gray Iron Handbook*, now in preparation by the Gray Iron Founders' Society.

Letters to the Editor

All letters of broad interest which do not violate A.F.S. policy or good taste are publishable. Write to Editor, American Foundryman, 616 S. Michigan Ave., Chicago 5, Ill. Letters must be signed but will be published anonymously on request.

Hot Sand Trouble

A recent bulletin of the American Colloid Co. contained some pointed observations concerning the difficulty in using hot sand mixtures. I would like to underscore one of the statements: "An epidemic of hot sands usually occurs with increased production and it is unwise to increase pouring tonnage if sand bin capacity is not increased at the same time."

The fundamental characteristics of sand grains, clay minerals, and other bonding materials if known by management, would indicate to them that trouble is being asked for whenever they permit the temperature of the sand to go above room temperature for sand mixing and molding. The design of a sand preparation, distribution, and return system, is not a task to be contemplated unless the designer has a very thorough background of the physics and chemistry of the surfaces of the various materials which would be incorporated into the sand mixture.

D. C. Williams
Associate Professor
Ohio State University

Explains Effect of Calcium In Nodular Iron

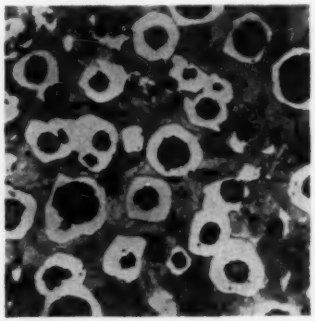
The comments of C. K. Donoho and J. E. Rehder (American Foundryman, March 1951, p. 62, 89, 91) are appreciated and are logically expected from research men who have contributed so effectively to the development of nodular iron from the very beginning. In referring to my paper, *"Eliminate Second Inoculation in New Nodular Iron Process,"* which appeared in the February issue of American Foundryman, page 41, both comment directly or indirectly on the carbide stabilizing effect of calcium.

It is possible if not probable that high calcium concentrations have a carbide stabilizing influence in the same way as magnesium. However, it is extremely difficult to get into solution such a sufficiently high amount of calcium. Mainly due to lack of time, we are ignoring at present the exact calcium content of calcium or calcium-magnesium nodular irons. Regarding the carbide stabilizing effect of calcium, we will have to postpone conclusions until accurate determination of residual calcium is possible.

Most of our previous work on the straight magnesium process was done with Mg-Ni-Si alloys containing approximately 45-50 per cent silicon. This silicon acts as a secondary inoculant, but additional inoculation is necessary to avoid free carbides in small sections, except perhaps for the lower magnesium limit and very high final silicon. Nodular irons treated with calcium and calcium-magnesium (final magnesium under 0.02 per cent) don't show free carbides in small sections (½ in.) even when final silicon is 2.0 to 2.2 per cent—a rather low silicon content. According to our experience, a magnesium-treated nodular iron with final silicon in this range, and magnesium equal to or greater than 0.04 per cent, needs secondary inoculation even when the magnesium treatment is done with a 50 per cent silicon alloy in order to avoid free carbides in a ½-in. diameter sand cast bar.

It is quite possible if not highly probable that secondary inoculation is unnecessary in the calcium and the calcium-magnesium process (with limited residual magnesium) because of the very low residual calcium in the former and the very low residual calcium and magnesium in the latter.

We have recently used improved alloys and some are quite different from those indicated in the above-mentioned article. The physical properties indicated there were much inferior to those of the straight magnesium process. With the improved inoculants and larger melts (20 to 25 lb) we often obtain physical properties comparable with those of magnesium-treated nodular irons. The photomicrograph shows (Editor's Note: Typical of several



accompanying the letter.) some of our very good results. And we are getting such properties, on test specimens that are machined from 1-in. diameter sand cast bars, as:

Tensile Strength, psi	95,300	98,850
Elongation, per cent	4	5
BHN	214	227

The nodular irons such as are illustrated in the photomicrograph result from studies of the addition alloys. In these experiments all factors except composition and quantity of added alloy are kept constant; final composition and physical properties of the irons obtained may

(Continued on Page 182)

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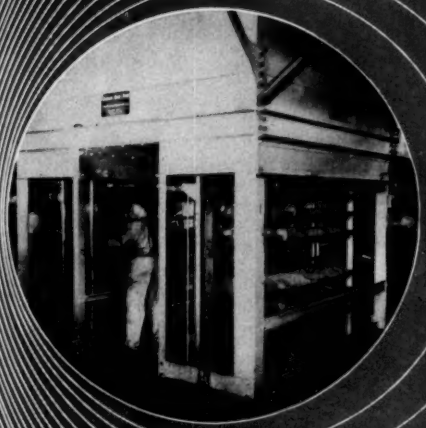

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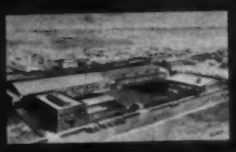

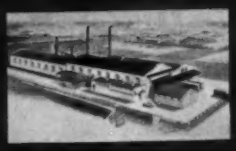


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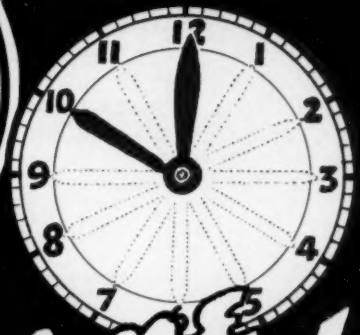

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APRIL 23--26

There will be no foundry exhibit this year, but our representatives will be at the foundry convention and will be pleased to contribute to your after-session entertainment in Hotel Statler.

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Famous Cornell Cupola Flux ensures better castings because it purges molten iron of impurities, enables you to pour hotter, more fluid iron into molds, and reduces sulphur.

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CUPOLA OPERATION IS MORE EFFICIENT. There is less bridging over, cleaner drops, and maintenance is greatly reduced due to minimized erosion of brick or stone lining.

Besides, the Scored Brick Form makes it the easiest flux to use. Just lift it out of container and toss into cupola with each ton charge of iron or break off one to three briquettes (quarter sections) for smaller charges, as per instructions.

Takes practically no labor to use.

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CLEANSES MOLTEN BRASS, even when dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves you considerable tin and other metals and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

Famous CORNELL ALUMINUM FLUX

CLEANSES MOLTEN ALUMINUM so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula greatly reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

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FOUNDRY *lities*

Aubrey J. Grindle of Whiting Corp.'s foundry equipment engineering staff has been appointed chief of the Foundry Equipment & Supplies Section, Machinery Division, National Production Authority

A. J. Grindle

and will make his headquarters in Temporary Building "T," 14th and Constitution Aves., Washington 25, D. C. Mr. Grindle will be a featured speaker at the Foundry Equipment & Supplies Industry Luncheon to be held at noon, Tuesday, April 24, at the Statler Hotel, Buffalo, in conjunction with the 55th Foundry Congress of the American Foundrymen's Society, to be held in Buffalo this month.

Barton B. Wadsworth and **Edward L. Kropa** have been appointed division vice-presidents of Borden Co., and **Eugene J. Sullivan** has been named sales manager for the company's line of industrial adhesives. Mr. Wadsworth has been with Borden's Chemical Division for 20 years and had been assistant sales manager since last year. Dr. Kropa joined the Chemical Division as chemical director in 1949 and is one of 106 scientists to win a fellowship in the New York Academy of Sciences this year.

Frederick W. Thomas has been named director of purchases for Joy Manufacturing Co., Pittsburgh, succeeding **George R. Fox,** who has been appointed assistant vice-president in charge of the company's plant expansion program. Mr. Thomas was formerly director of purchases for Worthington Pump & Machinery Corp., Depew, N. Y. Mr. Fox joined Joy in 1945 as plant works manager and was named director of purchases for the company in 1949.

R. F. Merwin has been elected president of Eriez Manufacturing Co., Erie, Pa., succeeding **O. F. Merwin,** 79, who becomes chairman of the company's Board of Directors. R. F. Merwin, following his graduation from Hiram College was for a time a newspaperman, later joining Eriez as sales manager and becoming vice-president and general manager.

Raymond H. Schaefer, director of Research and Development for American Brake Shoe Co., has been elected a vice-president of the company. Mr. Schaefer, a graduate of Carnegie Institute of Tech-

R. H. Schaefer

nology, joined Brake Shoe in 1940 as assistant foundry metallurgist in the company's American Manganese Steel Division, and was appointed director of Research and Development in 1947, a position he will continue to hold in addition to the vice-presidency.

National medal awards for outstanding leadership in the steel casting industry

Award Krynitsky Meritorious Service Medal

A. I. Krynitsky (left), former chief of the experimental foundry, National Bureau of Standards, receiving a Meritorious Service Medal from Charles Sawyer, Secretary of Commerce, at a ceremony February 14. Retired November 30, 1950, Mr. Krynitsky has long been known to the foundry industry through his technical papers and participation in A.F.S. Conventions and national committee activities. His Certificate of Merit accompanying the medal cites him "For extremely competent performance of official duties for over 32 years in the National Bureau of Standards, including valuable contributions to science and technology in the field of foundry metallurgy." Mr. Krynitsky's most recent paper, "Silica Sands–Sieve Analyses," written with F. W. Raring, will be presented during the 1951 Convention. Photo courtesy of Jack H. Schaum, NBS.

were announced at a recent meeting of the Steel Founders' Society of America. The Society's top award, the Lorenz Memorial Gold Medal, has been presented to **Thomas H. Shartle**, president, Texas

T. H. Shartle

P. H. Stuff

G. A. Lillieqvist

Electric Steel Casting Co., Houston, and SFSA president for the last two years. **Paul H. Stuff,** Ross-Meehan Foundries, Chattanooga, was the recipient of the Society's 1950 Technical and Operating Medal; and **G. A. Lillieqvist,** American Steel Foundries was recipient of SFSA's annual *Steel Foundry Facts* award for excellence of material published in the Society's Technical publication. Also an-

(Continued on page 171)

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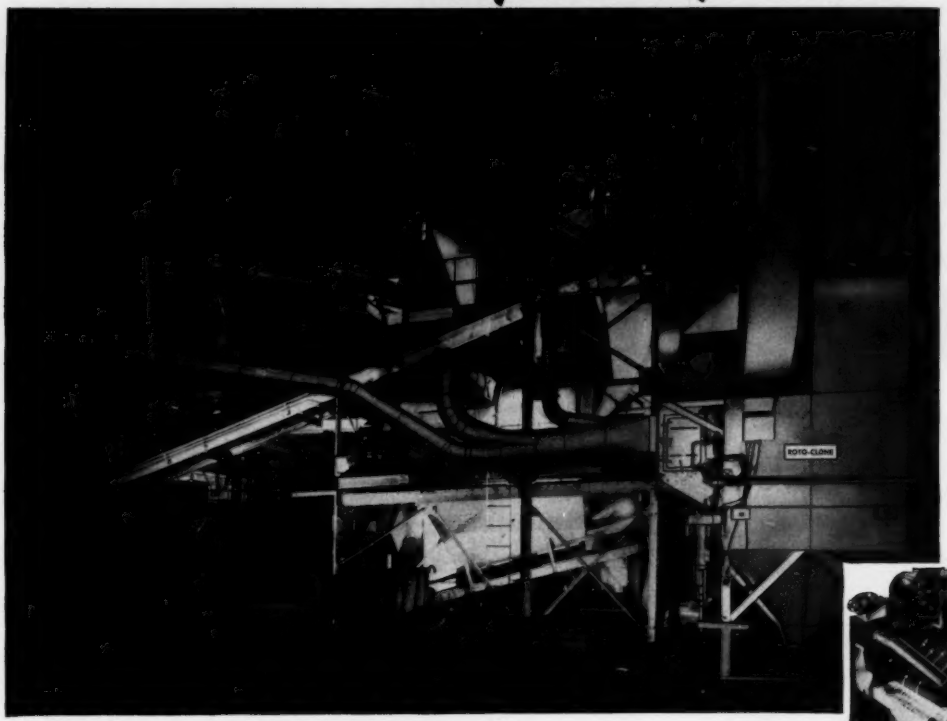

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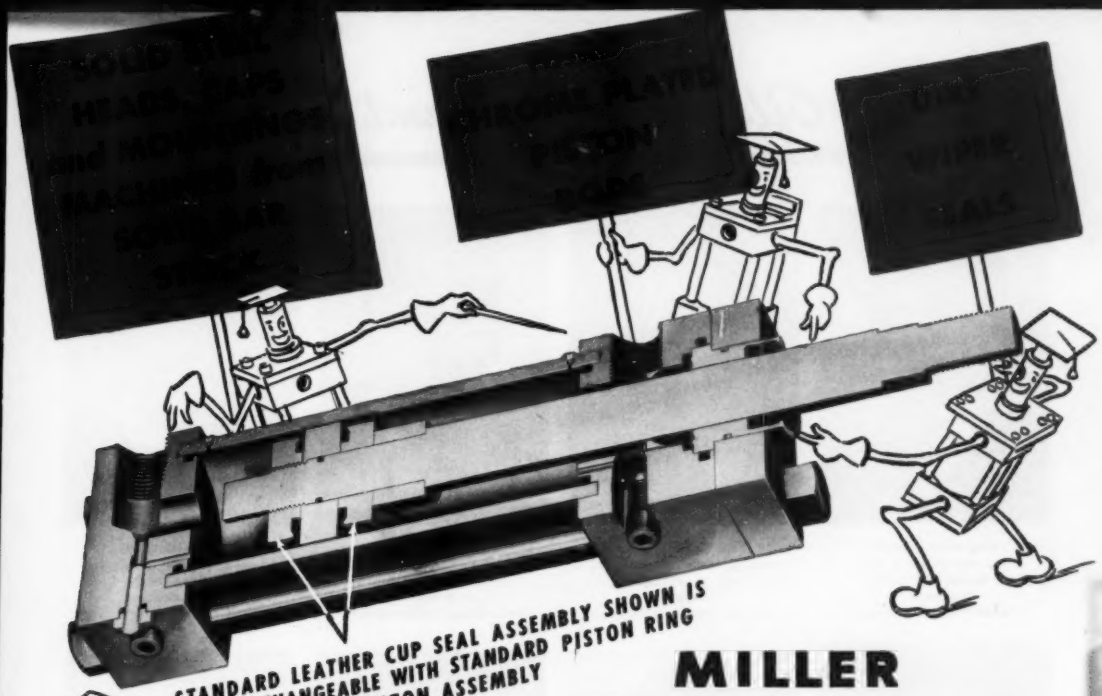

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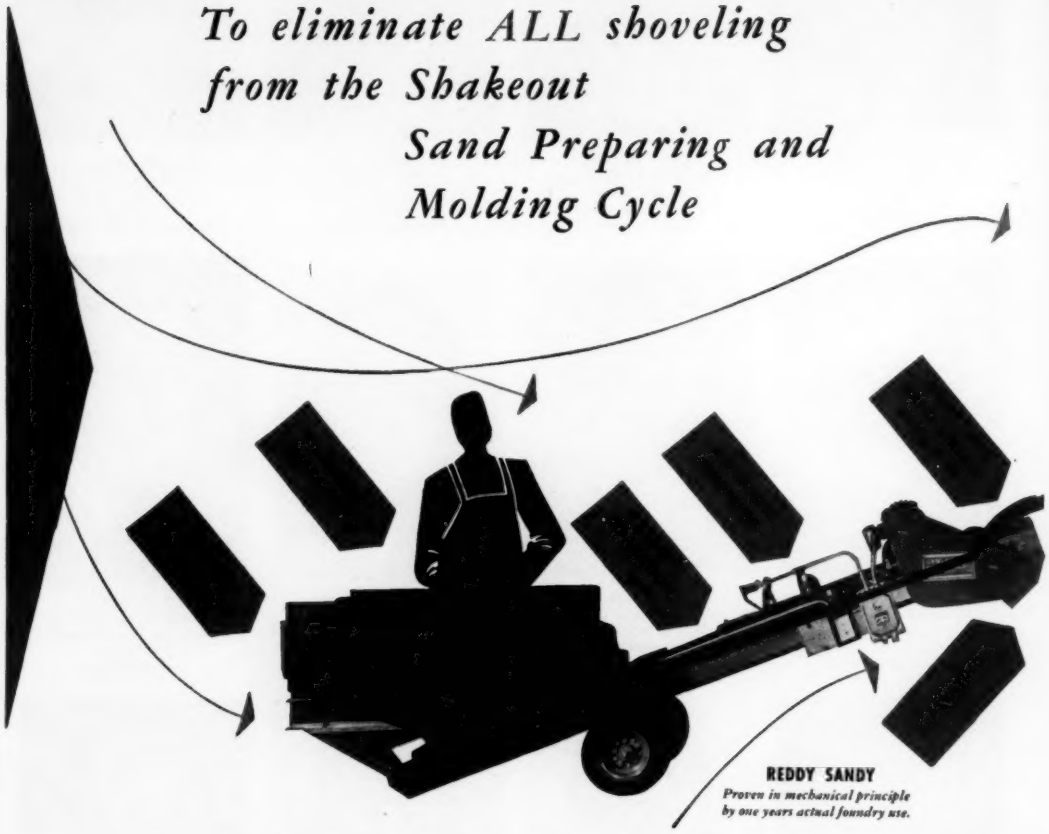
To eliminate ALL shoveling from the Shakeout Sand Preparing and Molding Cycle



REDDY SANDY
Proven in mechanical principle by one years actual foundry use.

At last, the hard work normally connected with shake-out and sand-conditioning operations, has been eliminated. Now, all you have to do is dump the mold on the vibrating deck of the new Reddy Sandy and the rest of the job is done for you. The top or shake-out deck separates the sand from castings and cores. The vibrating screen under the shake-out deck of the Reddy Sandy screens the sand and removes tramp iron and core butts without shoveling of any type. A magnetic separator (optional) removes smaller metal particles and an automatic tempering device uniformly adds water. As the sand is discharged from the Reddy Sandy, a built-in Aerator blends in the water, fluffs the sand and cools it.

By using the Reddy Sandy with the time-tested Handy Sandy, sand never has to touch the floor. Reddy Sandy delivers the prepared sand onto the wing boards of the Handy Sandy where it is raised by means of a bucket elevator into an overhead storage hopper conveniently located for the molder. As the sand enters the hopper, it is given an additional aeration, by an Aerator built into the elevator. There is no shoveling anywhere from the time the flask is dumped until the molder opens the hopper to allow the sand to drop into the flask.

The shake-out deck of the Reddy Sandy is a convenient height so molds can be dumped with little effort. Equipped with pneumatic-tired wheels, the Reddy Sandy is easily moved from floor to floor.

Send now for full details and prices. Write Dept. AF.

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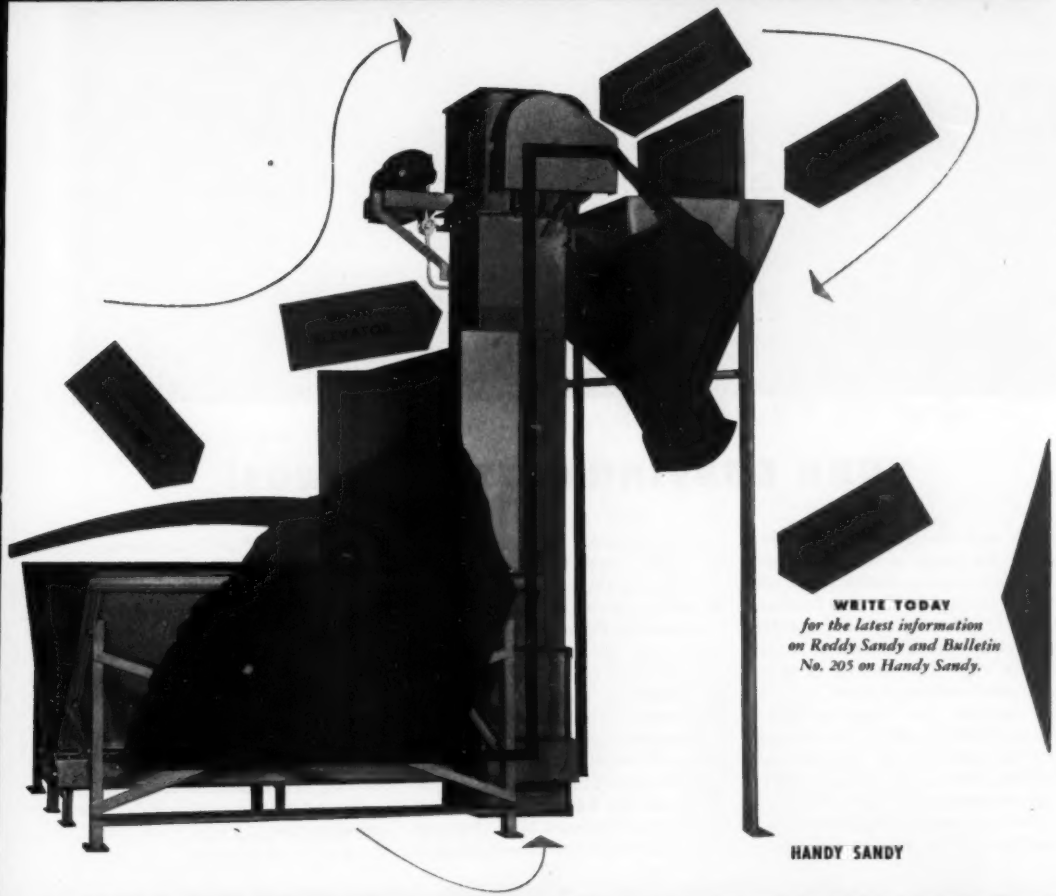
HANDY SANDY



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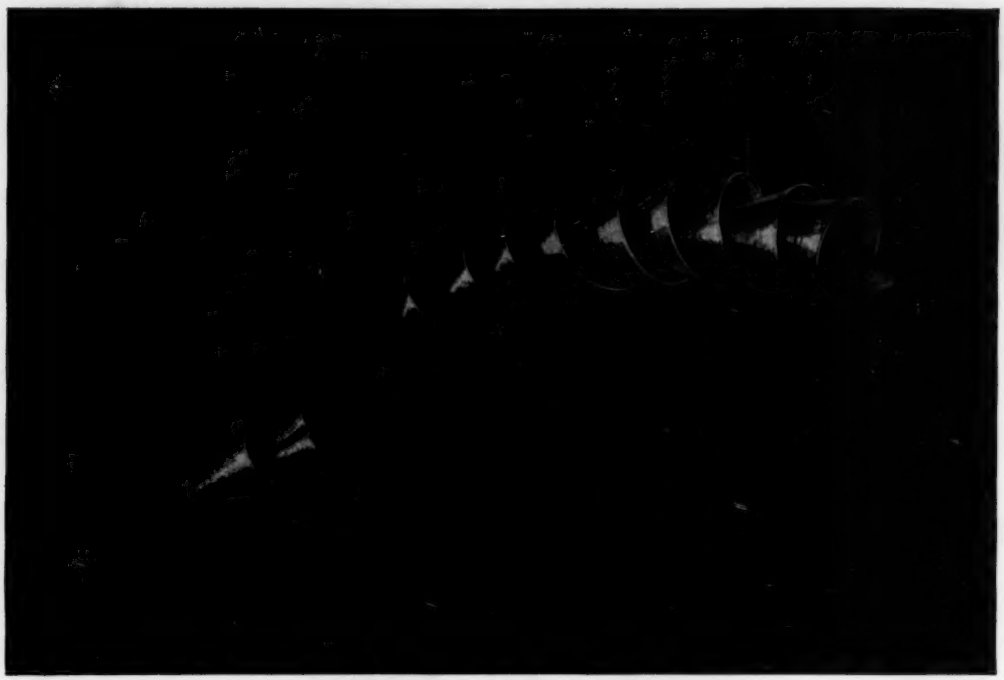

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There are several ways foundries today can conserve metals, reduce costs, and increase profits...through the adoption of the Croning Process. This "C" Process utilizes special BAKELITE Phenolic Bonding resins for the rapid heat-setting of *thin-shell* sand molds and cores.

Foundries are reporting tolerances of .002 to .005 of an inch per inch on parts cast by this process. Besides, the castings possess wellnigh pattern-smooth surfaces.

Such castings conserve metals by greatly reducing the amount of machining required, often just a finish cut being needed. They conserve metals by minimizing rejects. Whether you cast ferrous or non-ferrous metals, these thin-shell molds and cores will reduce your scrap pile—or your customers' if they do the finishing—and pile up greater production instead!

Because of their dimensional stability and excellent moisture resistance, thin-shell molds and cores can be stored for long periods, raising production efficiency by letting you build up inventories to match anticipated quotas of metal and demands for output.

Of utmost importance, too, is the time saved by rapid preparation of the cores and molds. And further time and energy are saved by the fact that you handle no more than 10 per cent of the sand normally handled.

Why not investigate fully this technically advanced method of casting. Write Department BW-29 using the coupon provided for your convenience.

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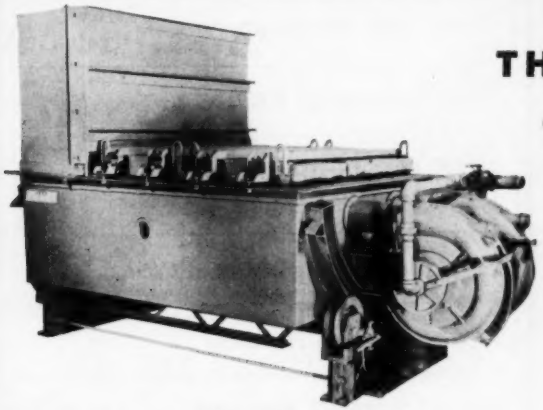

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Performance and economy are the keynotes of the new Reda Reflecting Type Direct Fired Melting Furnace for ferrous and non-ferrous metals. Advantages sought by all foundry owners, both large and small, are inherent in these cleanly designed, highly efficient furnaces.

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SERIES	IRON	BRASS	IRON	BRASS
400	400 #	450 #	1000 #	1350 #
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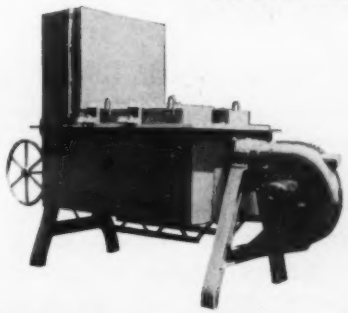
400 Series



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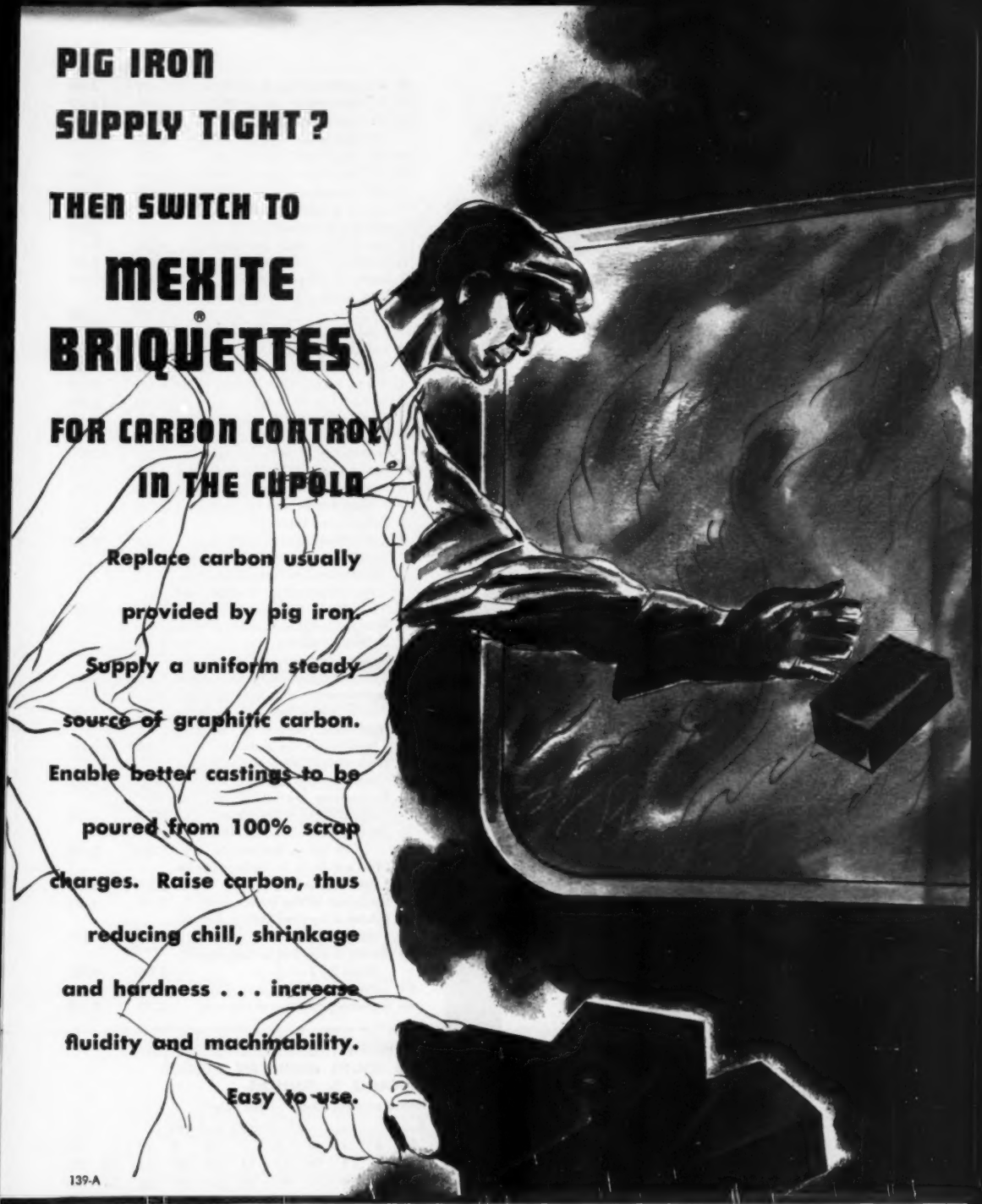

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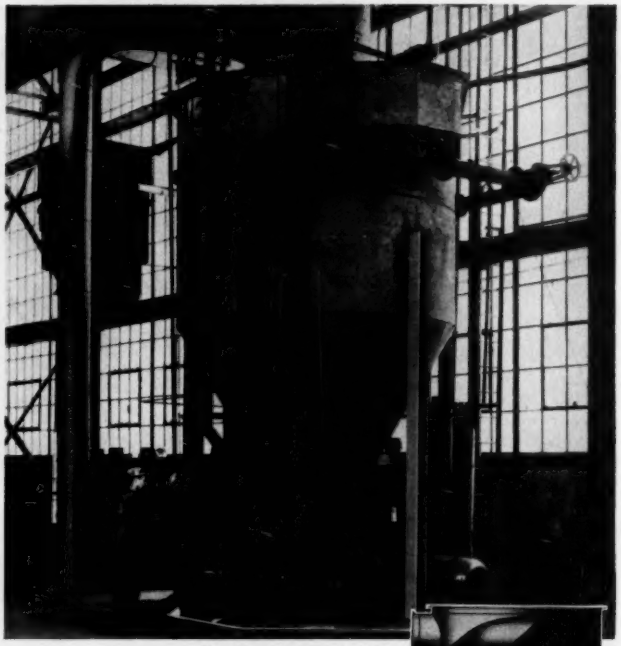

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SIX-SECOND CYCLE— REDUCED FATIGUE

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SIMPLE AUTOMATIC OPERATION

This new Sutter unit is used at the end of a core blower with the core box indexing in and out as a single operation, or may be placed in a loop set-up allowing the core box to pass over and around to the blower operator.

Equipped with a double rollover frame, the operator is able to blow a core with a second box as the first box already blown moves to a bottom position where the core is drawn automatically without any attention from the operator.

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Built in our own modern machine shop, this machine has a rugged design with all wearing parts hardened and ground. Anti-friction bearings used in the rollover frame. Power-rollover and draw features have speed control permitting attainment of any production cycle.

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300% ANNUALLY

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Model SP-500

SOLVE YOUR FOUNDRY PRODUCTION PROBLEMS WITH SUTTER SPECIAL FOUNDRY EQUIPMENT

Core Grinding problems solved by machines designed for the special demands, including fixtures, etc.

Automatic Water tests of various types of rough castings.

Rollover Power draw machines are interchangeable for right or left hand jacket cores, replaced single hand and hand draw operations. Result, production more flexible, reduced labor fatigue.

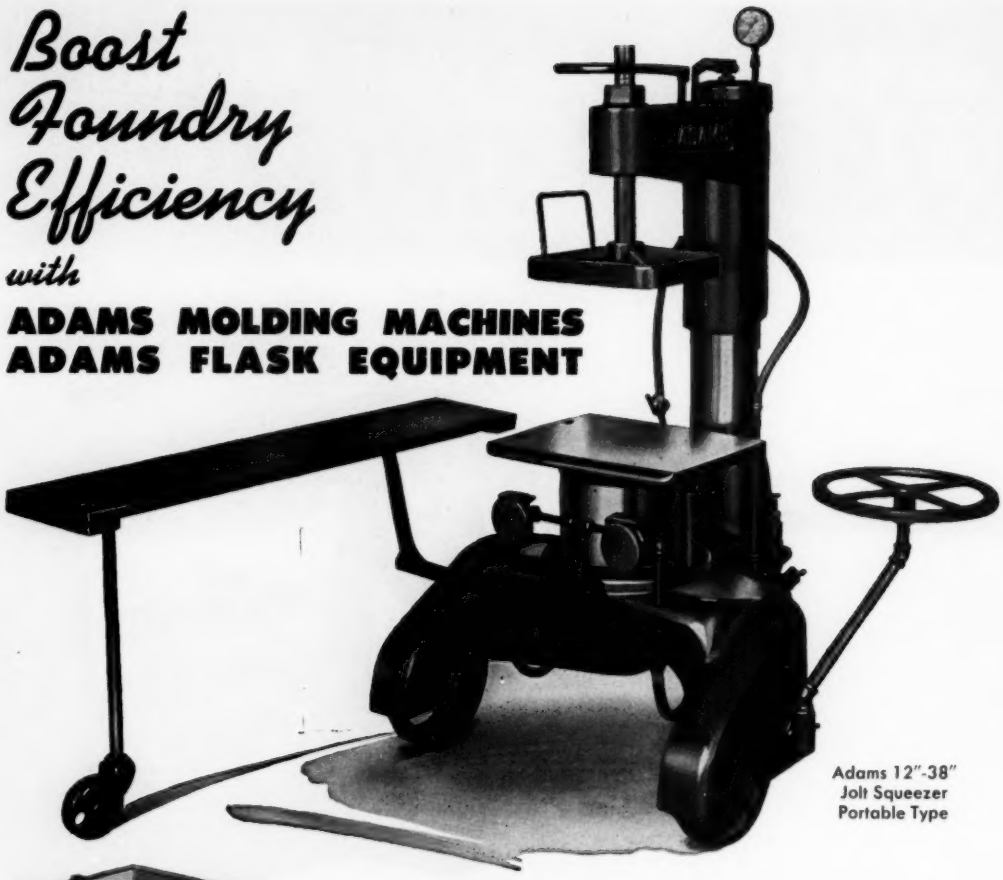
Automatic Power rollover and draw machines designed by Sutter, saved labor and increased core production.

Core Assembly and setting fixtures engineered by Sutter to meet specified customer's requirements.

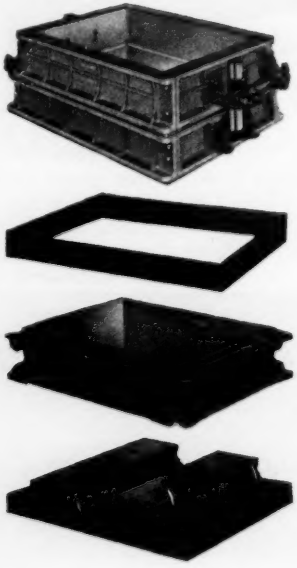
Boost Foundry Efficiency

with

ADAMS MOLDING MACHINES
ADAMS FLASK EQUIPMENT



Adams 12"-38"
Jolt Squeezer
Portable Type



SIXTY-SIX YEARS of supplying foundries has given Adams experience and skill in designing machines and equipment that help boost efficiency in your foundry. Call on Adams for quality Flask Equipment, custom-built to your specifications. The complete line includes practically every type of flask, jacket, upset, presser board, bottom plate and band. Adams time and money saving Molding Machines are available in pneumatically operated post and side rod types, in portable and stationary models, also hand operated models.

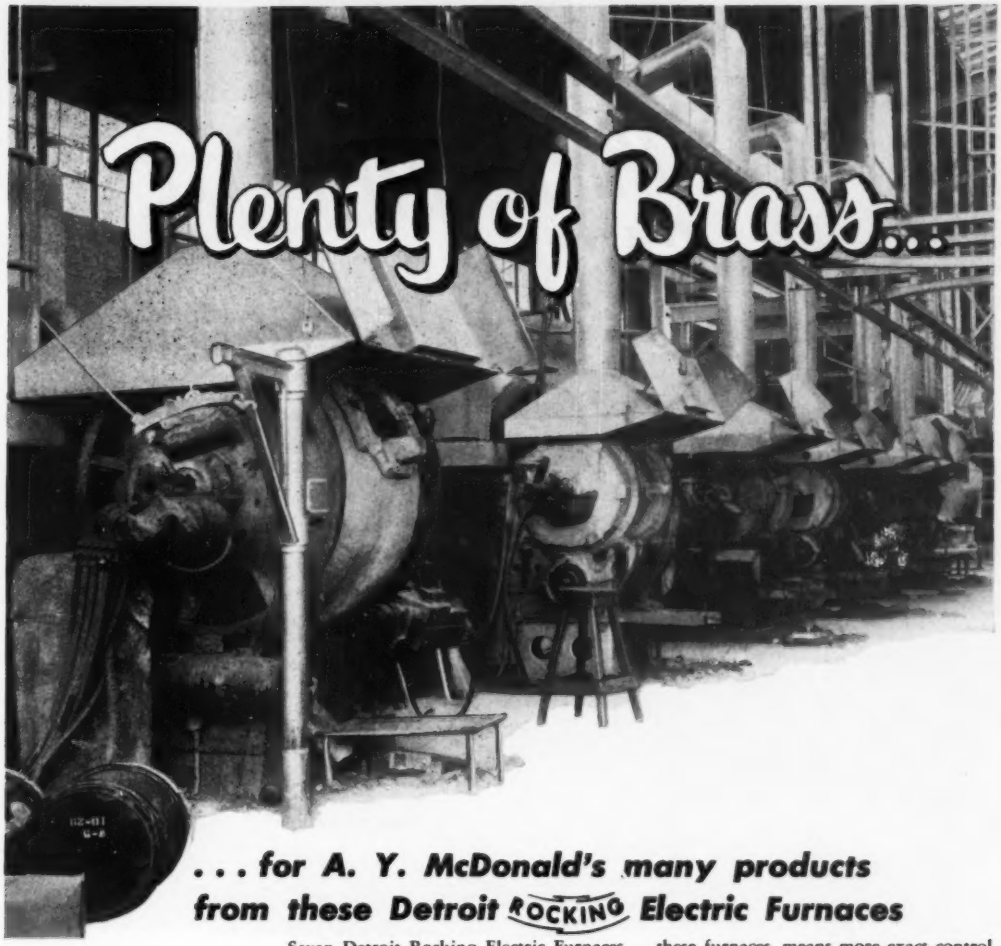
All Adams equipment is built by master craftsmen with the finest materials available, and the most up-to-date manufacturing facilities and methods. Write today for descriptive literature.

Manufactured by

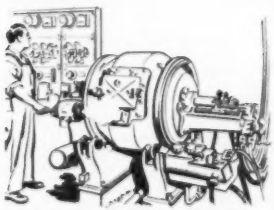
The Adams Company

Dubuque, Iowa, U. S. A.

1883 — SIXTY-NINE YEARS OF SERVICE — 1950



. . . for A. Y. McDonald's many products from these Detroit ROCKING Electric Furnaces



Faster melts— better melts— ROCKING ACTION DOES IT!

Seven Detroit Rocking Electric Furnaces in the foundry of A. Y. McDonald Company, Dubuque, melt the brass used in the products of this well-known manufacturer.

In this plant, as in hundreds of others throughout the country, Detroit Electric Furnaces deliver high-quality, uniform melts with great speed and efficiency day after day.

ROCKING ACTION

This exclusive feature makes for faster melts, more economical use of heat, minimizes the possibility of segregation. Close control of the rocking cycle, possible with these furnaces, means more exact control of melt characteristics, duplication of desired results through melt after melt.

RESULTING ECONOMIES

Better melts mean better castings, fewer rejects. More complete use of power means lower power costs. Better design results in less down time, lower maintenance costs.

Detroit Electric Furnaces are available in capacities from 10 to 4000 lbs. for ferrous or non-ferrous melting. Send your data. Let us show you the benefits you can have with Detroit Electric Furnaces!

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

Foreign Representatives: In BRAZIL—Equipamentos Industrias "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Casco, S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F.

Triple reasons for specifying...

TRIPLE ALLOY STEEL CASTINGS *containing* NICKEL

1 PERFORMANCE—Strength and toughness, resistance to wear, fatigue or shock to meet a wide range of requirements, as dictated by design.

2 VERSATILITY — Ability to meet varied specification demands after suitable heat treatment.

3 ECONOMY — The combined effects of triple-alloy additions produce maximum hardenability at low alloy cost.

Triple-alloy steel castings have established outstanding service records in some of the most exacting industrial applications. Many of the lower alloy types can be handled in the shop with techniques not differing greatly from those employed with carbon steels.

We invite inquiries regarding the production, treatment or uses of triple-alloy steels, containing Nickel.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N. Y.

FERRO SILICON FROM TENNESSEE

Ferro Silicon from Tennessee is supplied in lump crushed sizes and briquette form—in standard or low impurity grades. Standard briquettes in 2½ or 5 pound sizes.

Order your Ferro Alloys in mixed cars of Ferro Silicon, Ferro Manganese and briquettes for freight economy. Let us quote prices on these dependable products.

AGENTS:
Miller & Co., Chicago, St. Louis, Cincinnati
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EXPORT AGENT:
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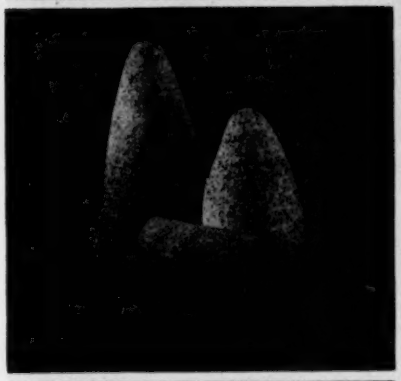
TENNESSEE PRODUCTS & CHEMICAL *Corporation*
NASHVILLE, TENNESSEE

FERRO MANGANESE COKE PIG IRON FERRO SILICON

High Level PRODUCTIVITY



CARBORUNDUM's *complete* line of bonded products for general purpose and weld grinding expedites a high rate of production at lowest cost with the *right* abrasive for every grinding operation. Typical of these high-efficiency bonded products is our new *rubber bushed* Type 1 Portable Grinding Wheel—a specially-designed product with *built-in* rubber bushing that lessens operator fatigue by dampening wheel vibration. Greater production efficiency and improved finishes result from reduced wheel "bounce" which results in more continuous wheel contact. See your CARBORUNDUM representative for full details.

Only CARBORUNDUM
TRADE MARK

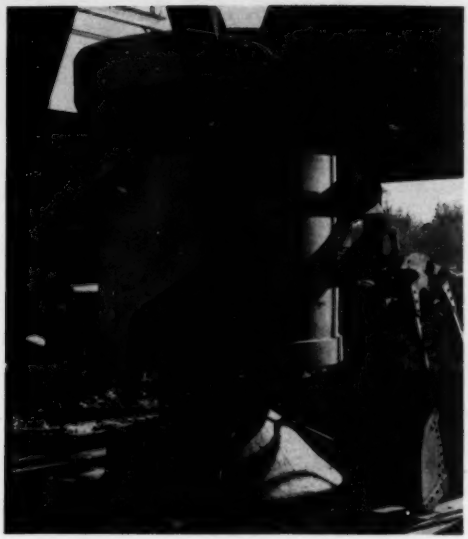
makes ALL abrasives to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, N. Y

PRODUCTS *Parade*

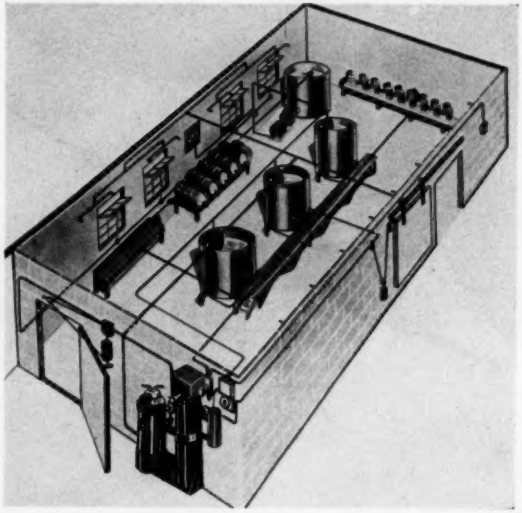
AN EXHIBIT ON PAPER

AMERICAN FOUNDRYMAN herewith presents its annual non-exhibit year feature, "*Products Parade*," designed to provide a showcase for the display of the newest developments in foundry equipment and materials at Convention Time in a year when the biennial A.F.S. Foundry Congress & Exhibit is not held. On the pages of this "Exhibit on Paper" will be found the outstanding tools of the foundry craft developed recently by the nation's equipment and materials manufacturers. More detailed information on products described herein may be obtained by filling in and mailing the prepaid postcard appearing on Page 155, at the end of this section.



3. Cone Bottom Bucket. ➡

Whiting Corp.'s new Cone-Bottom Bucket makes it possible for users of skip chargers to enjoy benefits of full cone-bottom charging. Controlled Discharge Full Cone-Bottom Bucket is fully automatic in opening and closing, requires no inspection during its cycle, and dribbles charge to the inside periphery of the cupola.

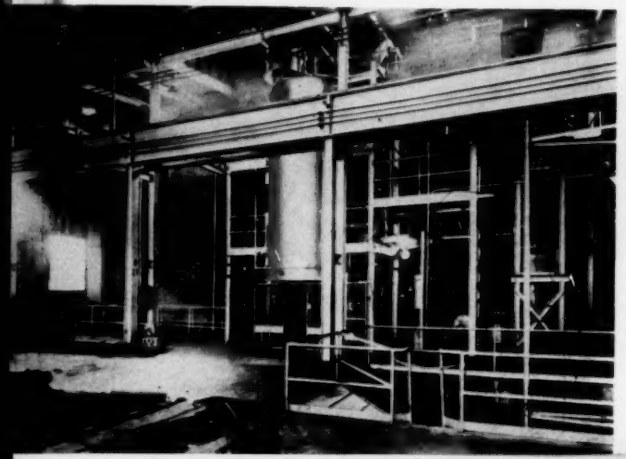


4. Dry Chemical Fire Protection System. ⬅

Designed for automatic protection of metal casting plants, Ansul Chemical Co.'s new fire protection system is the first to use dry chemical as an extinguishing agent. When fire starts and temperature increases, air expands within head, tripping nitrogen cylinder release and pressurizing chemical container, which discharges chemical onto fire. Automatic controls can be added to close doors, windows, ducts, etc. System can also be operated manually.

5. General Duty Work Gloves ⬇

Particularly applicable to foundry shakeout and grinding operations, Richmond Glove Corp.'s general duty work gloves feature seamless palm, reinforced thumb, chrome-tanned leather facing on palm, thumb, fingertips and knuckles, and flannel liner and back. Available with 4-½-in. or 2-½-in. cuffs.



6. Wet Sand Reclamation System. ⬅

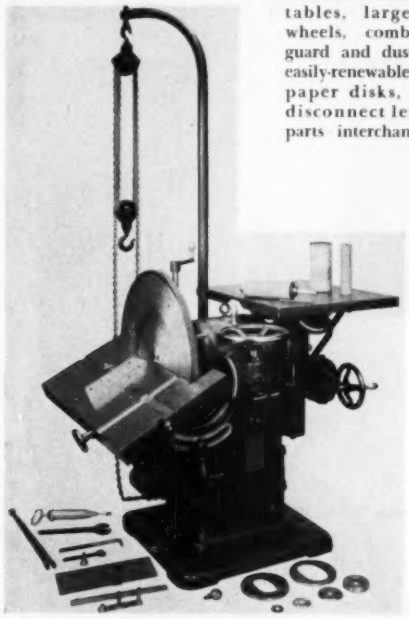
This photograph of a Wet Sand Reclamation System installed in a large Eastern foundry by Nichols Engineering & Research Corp. shows classifier, scrubbers, multiple hearth furnace and conveyor and elevator for returning reclaimed sand to storage bin.

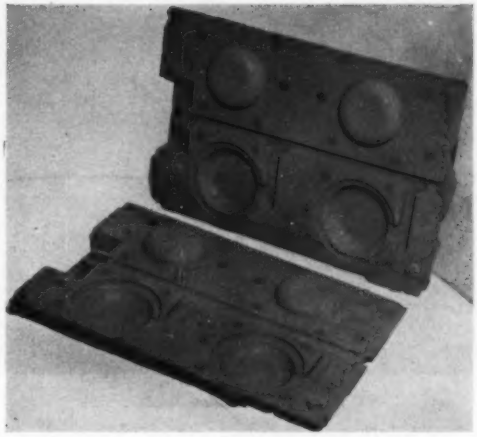
7. Heat Resistant Floors.

Universal Atlas Cement Co.'s Lumnite floors for foundries and other industrial installations where floors are subject to extreme heat and spilled molten metal, will withstand thermal shock of 2800 F. Easily installed with minimum of outage time, heat-resistant Lumnite concrete reaches services strength within 24 hrs or less after pouring. Changeover to Lumnite concrete from dirt floors in foundries permits handling of ladles with lift trucks.

8. Disk and Spindle Sander.

Oliver Machinery Co.'s No. 34 Disk and Spindle Sander combines two sanding operations in a single machine, accomplishing work formerly done on trimmers, lathes, band saws and jointers. Soft or hard woods, knots, cross or end grains, nails, screws and brads used in wood or metal patternmaking can be sanded accurately and quickly. Machine can be furnished as disk and spindle sander; double disk sander; or as a double spindle sander, as required. Features: two tilting tables, large hand wheels, combination guard and dust chute, easily-renewable sandpaper disks, motor-disconnect lever, all parts interchangeable.





9. "C" Process Phenolic Resin Binders.

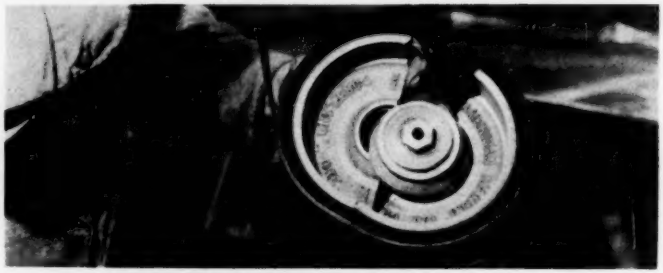
Two-half molds illustrated were produced by the Croning Process, using Bakelite Phenolic Resins as the binder. Molds are only thin shells but are strong enough to be handled without excessive care and can be stored indefinitely without shrinkage or warpage. Castings can be produced with tolerances of .002 to .003 per inch.

10. Foundry Materials Handler.

New 12 cu ft Hough Payloader can be used in the foundry to transport 950 lb of sand in a single bucketload or to perform such cleanup operations as hauling sprues, broken cores and burned-out sand. Unit features hydraulic bucket control, automatic bucket tip-back, short turning radius, 360 degree visibility, rear wheel steering, comfortable operator's compartment and constant mesh transmission. Payloader is powered by 30 hp gasoline engine, has 48 in. bucket with 12 cu ft capacity and fork lift static load capacity of 1000 lb.

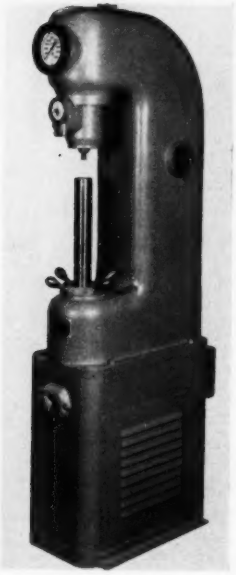
11. Heat-Resistant Protective Coating.

Lowebco, Inc.'s Oncrete, a durable, moisture-proof coating for furnace exteriors and protection of concrete floors, plaster, masonry and equipment, is long-wearing and withstands temperatures to 800 F without cracking or peeling.



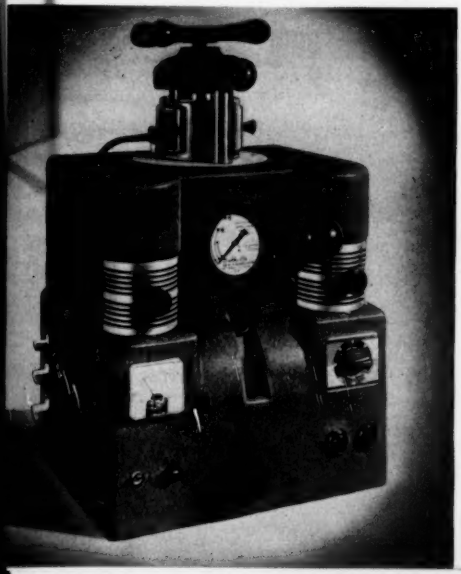
12. Drum Sander.

American Diamond Saw Sales Co.'s Cone-Loc Drum Sander is a hinged split drum using coated abrasive strips without need for joining ends of belts. Abrasive strips from ordinary rolls are wrapped around drum, hooked over pins, and halves are converted to a solid wheel.



13. Brinell Hardness Tester.

Motor driven, hydraulically-operated direct reading Steel City Brinell Hardness Tester makes up to 100 tests per hr, is semi-automatic, electrically-timed and is available with or without direct reading.



14. Dry Core Binder.

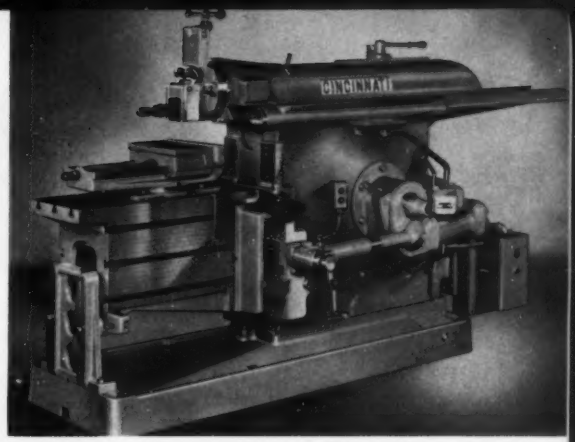
Stoller Chemical Co.'s new dry core binder, Superset, is odorless, easily mixed, and produces cores with low temperature reaction and gas content, high tensile strength, high scratch hardness, good edges, resistance to metal erosion and penetration, manufacturer claims.

15. Metallurgical Laboratory Press.

Buehler, Ltd.'s new No. 1330 A3 Speed Press has 10,000 lb capacity and quickly aids in preparation of mounted specimens in opaque bakelite or clear plastic. Molds, heating and cooling blocks are quickly interchangeable for 1, 1-¼ and 1-½-in. mountings. Features: semi-automatic mold lock and wheel screw, magnetic closure of heating blocks, easy exchange of heating units.

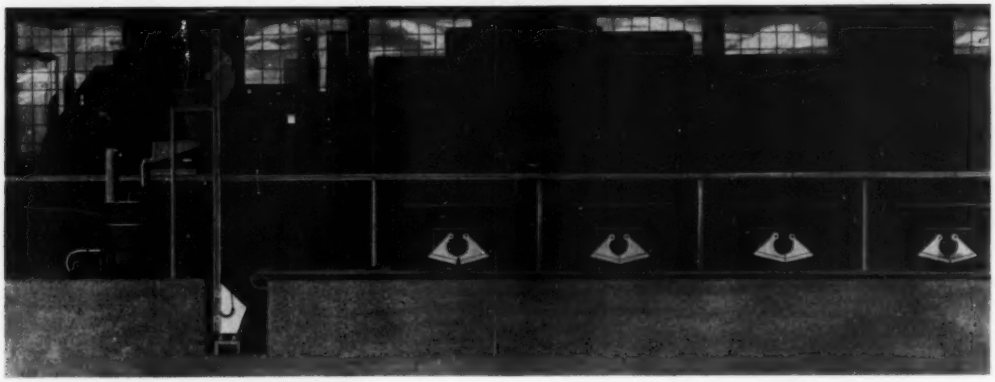
16. Heavy Duty Shaper.

Built in sizes ranging from 16 to 36 in. stroke, types of Cincinnati Heavy Duty Shapers include plain table, universal, utility, high-speed and special shapers. Standard equipment includes, protected table support, built-in power traverses, complete guards, direct-reading dials, automatic lubrication, and all controls handy to operator.



17. Automatic Sand Weighing Controls.

Leeds & Northrup Speedomax Recorder works in conjunction with electric strain gages to weigh sand automatically and control amount of sand supplied from different bins. Accuracy is such that mixtures are controlled within 1 per cent, permitting precision duplication of mixes. System is based on automatic control of vertical hoppers, which feed sand by conveyor belt to weighing dump bucket.

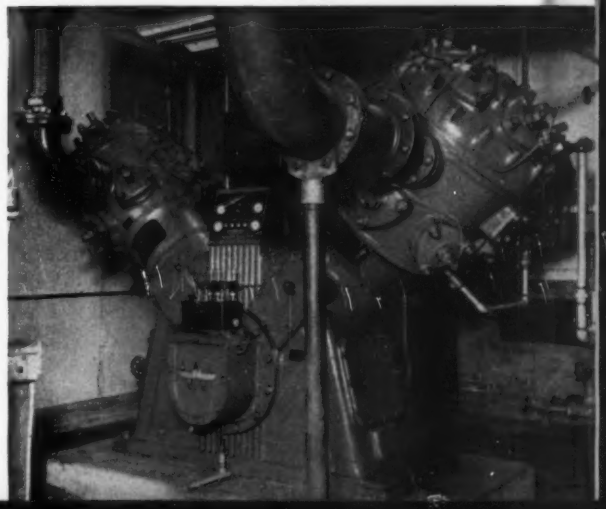


18. Wheeled Dry Chemical Extinguisher.

Walter Kidde & Co.'s new 150-lb powder capacity wheeled dry chemical extinguisher is designed to combat flammable liquid and electrical fires. Extinguisher is actuated by releasing nitrogen at 2000 psi to dry chemical cylinder, which discharges chemical through 50-ft heavy duty hose in either concentrated stream or dense blanket. All materials are corrosion resistant and are formulated to prevent absorption of moisture.

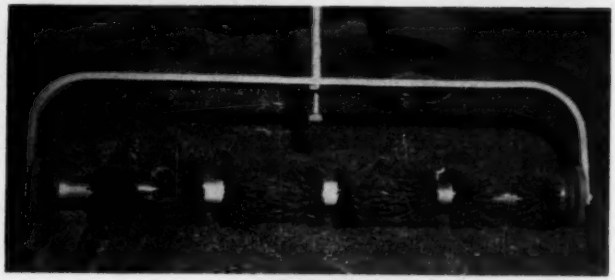
19. Air Compressor.

Worthington Pump & Machinery Corp.'s "Y" Type Air Compressor is designed for general air service in foundries. Installation costs for this type of compressor are low, since no foundations are required and unit occupies only a small space.



20. Strainer Cores

American Lava Corp.'s AlSiMag Strainer Cores are flat, hard ceramic strainers that fit into mold gate to insure even flow of metal into mold. Cores have thermal expansion, withstand all normal heats.

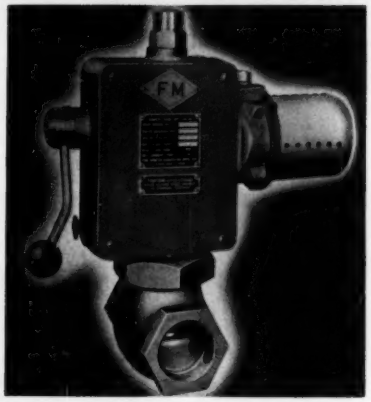


21. Magnetic Shot Sweeper

Multifinish Mfg. Co.'s non-electric magnetic shot sweeper salvages and removes tramp iron, shot, grit, etc., from underfoot. Easily unloaded by means of wiper ring. Five models available, including heavy-duty sweeper for removing gates and other large scrap from sand.

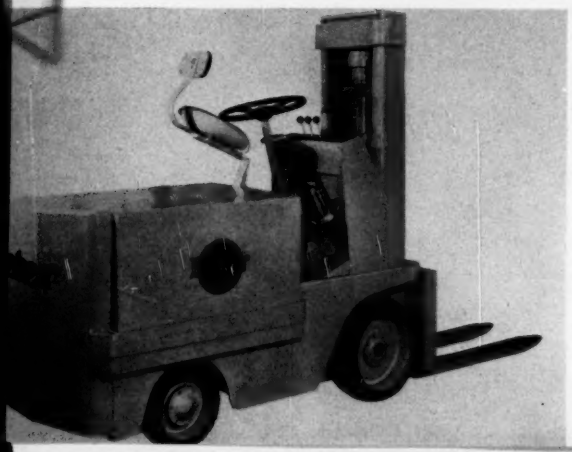
22. Interchangeable Chipping Hammers

Rotor Tool Co.'s new line of chipping hammers has five basic stroke sizes, from 1 to 3 in., interchangeable to give 15 speed and blow combinations. Barrels are unbreakable.



23. Safety Shutoff Valve

North American Mfg. Co.'s Series 21 Safety Shutoff Valve stops flow of gas or liquid instantly when solenoid current is interrupted, protecting industrial furnaces against dangerous fuel buildups when power fails.

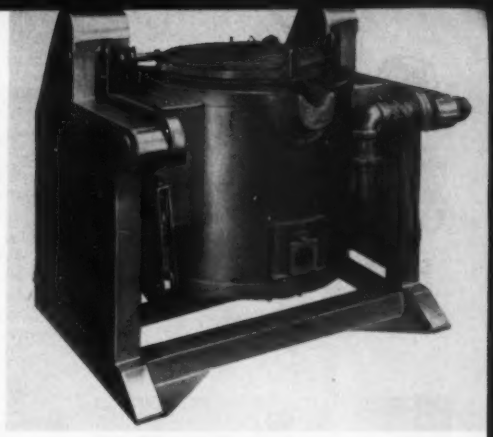


24. Center Control Fork Truck

Baker-Raulang Co.'s FT Center Control Fork Truck will handle 5000 and 6000 lb loads efficiently in plants where ruggedness and low maintenance are important. Features: 126-in telescoping lift, hydraulic lift and tilt, full vision, all controls in reach of operator.

25. Gas or Oil-Fired Furnace Crucible

Lindberg-Fisher Type MNF Gas or Oil-Fired Furnace Crucible for nonferrous metals accommodates crucible sizes 150 to 1000 and is designed for trouble-free operation under difficult conditions. Features: fingertip tilting control, pouring lip located in axis of tilt for constant pouring arc, eliminates need for shifting of molds or ladles during pouring, one man operation. Hydraulic or electric drives.



26. Heat-Resistant Aluminum Paint

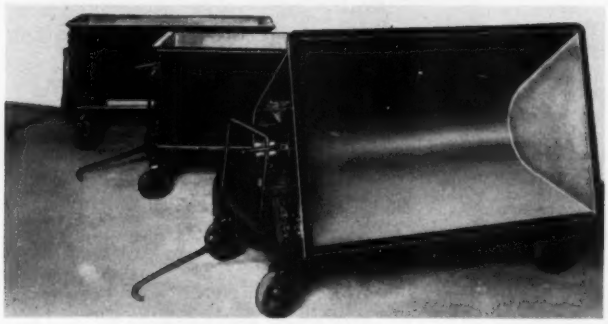
Speco, Inc.'s Heat-Rem H-170, an extra high heat-resistant aluminum paint will withstand temperatures up to 1700 F and, because of its silicone base, will fuse with surface metal immediately upon application. H-170 sets in four hours and dries completely overnight on hot surfaces, forming bright, elastic, corrosion and moisture-resistant surface. H-170 is packaged in quart, gallon and half-gallon cans.

27. Parting Compound

Acheson Colloids Corp.'s Aquadag, a colloidal dispersion of graphite in distilled water, is a parting compound for sand, permanent mold and die casting work.

28. Work Glove

Edmont Mfg. Co.'s Grab-It Work Glove's abrasion resistance recommends it for rough foundry work. Special safety cuff.



29. Side-Dump Truck

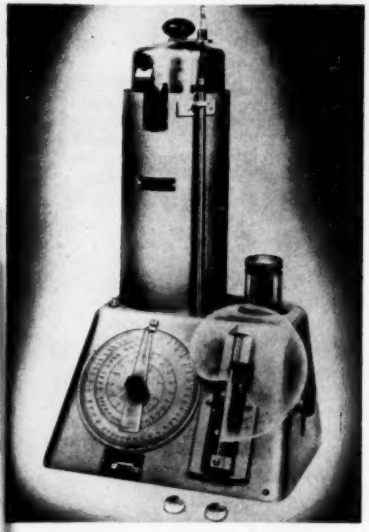
Klaas Side-Dump Shop Truck for any dry material from sand to castings, has 1 cu yd capacity, can be drawn by hand or mechanically, singly or in trains.

30. Dye Inspection Method

Northrop Aircraft Inc.'s Dy-Chek, a metal inspection process applicable to both ferrous and non-ferrous metal, utilizes a dye penetrant to reveal cracks and microscopic casting flaws. Red dye and other liquids painted on suspected metal cause defects to bleed in telltale scarlet lines, permitting examination of parts without removal from motors. Penetrant is easily applied by any foundry inspector or mechanic.

31. Electric Hammer

Skilsaw, Inc.'s simplified Portable Electric Hammer has only one working part and incorporates power unit of two alternately energized magnetic coils. Skil Electric Hammer strikes 3,600 blows per min., drills and channels concrete, chips metal, vibrates concrete forms. The 1⅛-in. hammer operates ⅜ to 1½-in. diameter star drills, is 16¼-in. long and weighs 20 lb.

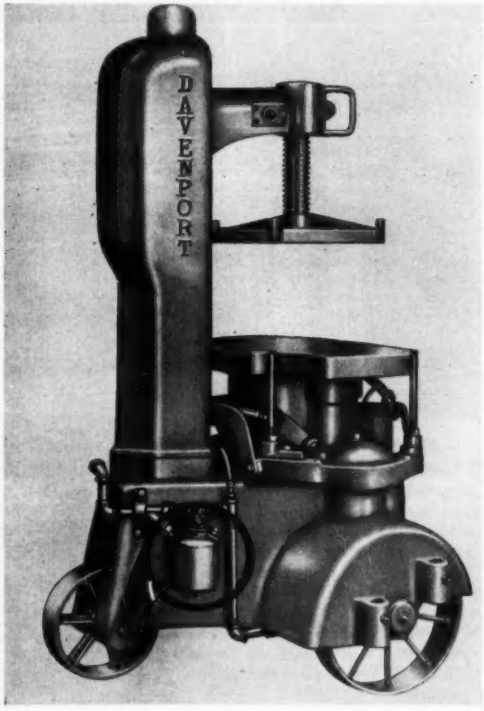


32. Permeability Tester

Harry W. Dietert Co.'s No. 335 Permmeter complies with all A.F.S. requirements for stopwatch permeabilities and provides for automatic permeabilities. Orifice method is added to the Permmeter for rapid control testing, with clear plastic scale.

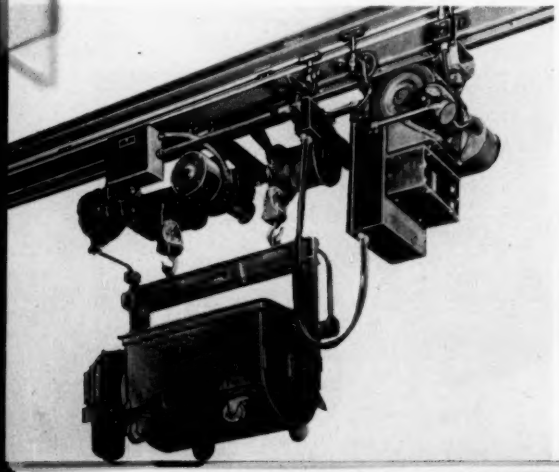
33. Automatic Air Oilers

Davenport Machine & Foundry Co. BR Automatic Air Oiler reduces wear on equipment by positive distribution of lubrication under pressure, is cut into airline and will not choke or overload. Oilers are now standard equipment on all Davenport foundry molding machines, assuring savings on equipment maintenance and increase in units' efficiency.



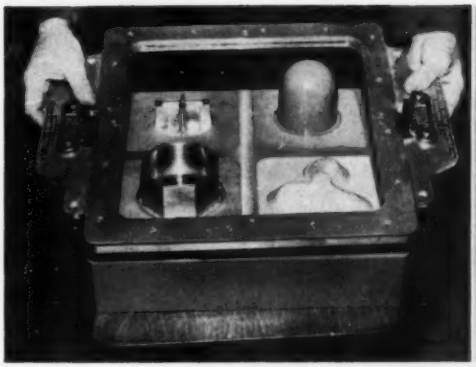
34. Automatic Dispatch Carrier

Originally designed for delivery of core sand to storage hoppers, American Monorail Co.'s Automatic Dispatch Carrier consists of MonoTractor for horizontal propulsion on MonoRail tracks, twin hook lift hoist and bucket mounted so gear head motor turns it one complete revolution. Control devices perform selective starting and stopping.



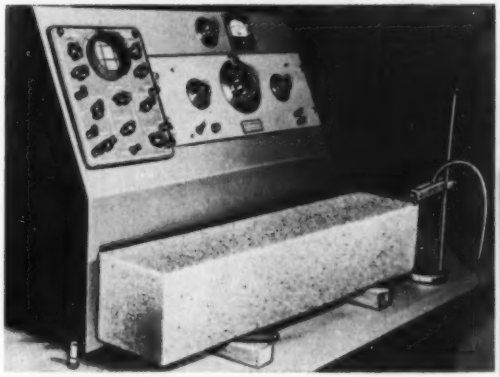
35. Matchplate Equipment

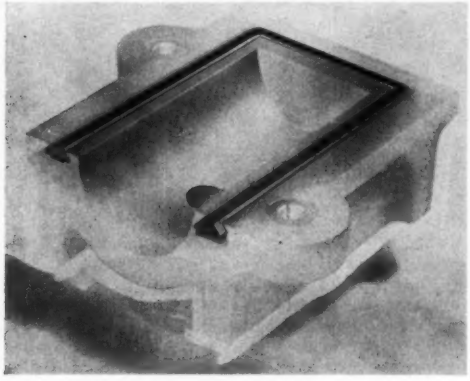
Cooper Alloy Foundry Co.'s two new matchplate-making developments are: (left photo) simple, flexible frame that provides for rapid switching of matchplates, permitting insert changes in 20 seconds without removing frame from flask and eliminating all loose bench work, saving storage and cutting costs in half. Spray gun (right photo) sprays low melt alloys and metals in conjunction with new aluminum core box making method. Gun weighs under 5 lb, has 7 lb metal capacity; is thermostatically-controlled; and has a non-clog, non-drip nozzle and an adjustable spray.



36. Electric Sonometer

Electro Products Laboratories' Electro Sonometer determines resonant frequency of such materials as aluminum, carbon electrodes, castings, ceramics, concrete, plastic, steel beams, pressed materials, etc. Oscillator measures resonant frequency from 20 cycles to 22 kilocycles in solid masses up to 1550 lb.





37. Core Box Sealer

Martin Engineering Co.'s Stripinsert Core Box Sealer holds the parting line without costly steel facing and is ideal for sealing between blow plate and sand magazine and effectively seals open-faced core boxes. Made of tough, oilproof rubber, Stripinsert is easily installed in old or new core boxes.

38. Hot Topping Compound

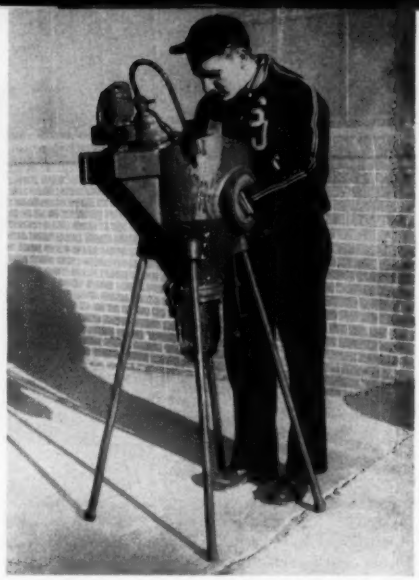
United States Graphite Co.'s Mexatop, a newly-developed hot topping compound, in actual plant tests has cut poured height of hot tops by 2 in., and has reduced metal in hot top by 1.5 per cent on maximum weight ingots, saving 3,000 to 4,000 lb per heat. Mexatop gives desirable U-shaped cavity in hot top and can be applied for 3c per ingot ton. Mexatop has proved equally effective on casting risers, and is available in 50-lb bags or drums.

39. Core Baking Unit

Induction Heating Corp.'s "One Man Coreroom" introduces the electronic core baking table. Model 300T has capacity of 350 lb of sand cores per hr, bakes cores up to 15-in. wide, 28-in. long and max combined height of core and core plate of 8 in. 72-in. turntable has adjustable speeds of 0 to 6 fpm. Green cores, plates or driers are placed on moving table. Operator can then remove finished baked cores, re-using immediately, as no cooling period is involved.

40. Midget Blast Cleaner

Pangborn Corp.'s new midget liquid blast cleaning unit weighs only 40 lb, operates from a ¼-in. air line or gas bottle and has a 15-in. diameter blast chamber, offering advantages of blast cleaning to many operations for the first time. No. O Type EZ Hydro-Finish Blast Cabinet uses abrasives as fine as 5000 mesh, and holds tolerances to within 0.0001 in. Unit is provided with chamber light, hand holes, knee or leg operating valve and ample observation window.

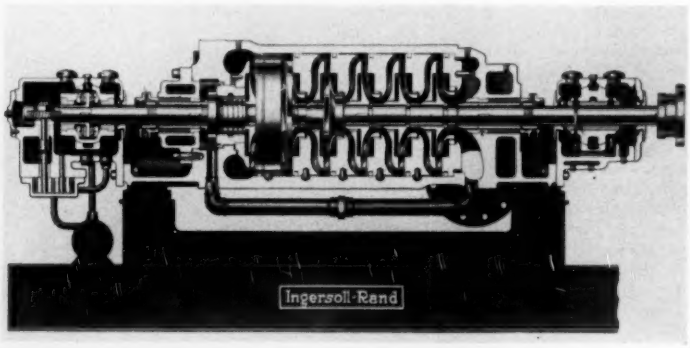


41. Large Diameter Air Cylinders

Miller Motor Co.'s new line of large diameter air cylinders have 15, 30 and 195 tons lifting power. The 20 in. diameter cylinder produces over 30 tons of lifting power at rated operating pressure of 200 psi, is of counterbalance type particularly adaptable for use on heavy production machinery and is also available in 18, 16, 14, 12, 10 and 8-in. bores. These are in addition to the standard line of Miller air cylinders available in 1½ to 14 in. bores. Cylinders are offered with a wide variety of convenient mounts.

42. Goggle Padding Mask

Willson Products, Inc.'s molded rubber detachable padding mask for its line of heavy-duty cover-all safety cup goggles assures an extra tight fit for better protection in welding, chipping, heavy dust and acid operations. Padding mask is attached by beaded molding which slips over eye-cup rims. It is replaceable without use of tools, assures snug fit for all face types, and provides added clearance when goggles are worn over prescription spectacles. Masks may be purchased with goggles or separately.



43. Centrifugal Pump

Ingersoll-Rand Co.'s Class HMTA Multi-Stage Horizontally-Split Centrifugal Pump is especially applicable to foundries where water is under high pressure, for cleaning cores out of castings. Units are available in 3, 4, 5 and 6 in. sizes, with from 3 to 9 stages.

44. Bucket Materials Handler

Butler Bin Co.'s "102" is a fast, maneuverable scoop-type materials handler and car unloader featuring bucket that is raised, lowered, tilted by one operating lever and permits 360 degree visibility. Features: 11 mph speed, 6-ft, 3-in turning radius; foam rubber cockpit; balanced steering; pneumatic, self-cleaning tires; no gears to shift.

45. Rust Preventive

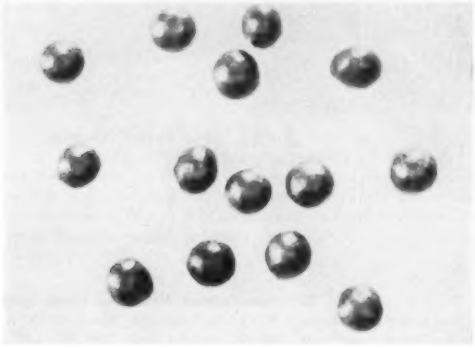
Swan-Finch Oil Corp.'s new SAF-pHilm is a dark, solvent organic, metal preservative developed for the protection of highly-finished surfaces, parts and equipment prior to storage or shipment. Fast drying, SAF-pHilm forms colored, yet transparent film within 15 min, easily removable with kerosene. Tough, elastic polar film resists alkalies, acids and abrasion.

46. Resin Core Binder

General Electric Co.'s G-E 12300 is a water dilutable phenolic liquid resin core sand binder, claimed to require half the baking time of regular core oils, provide exceptional dry strength and hardness and greater resistance to metal penetration and burn-in, improved collapsibility, easier shakeout.

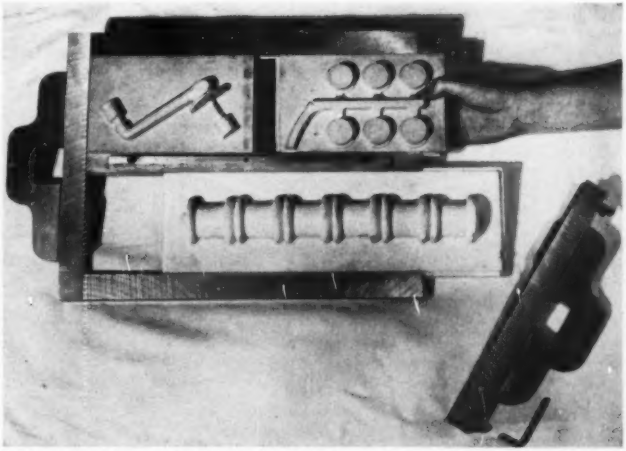
47. Abrasive Shot and Grit

Photomacrograph of "T" Shot sold by Hickman, Williams & Co., Inc., shows shot after it has made 50 passes through laboratory wheel testing machine. Shot and grit are approximately 200 BHN lower in hardness than conventional chilled abrasives and are ductile enough to prevent abrasive deformation before breakage occurs. Actual plant operating records show 15 to 40% cleaning savings effected by these abrasives, distributor claims.



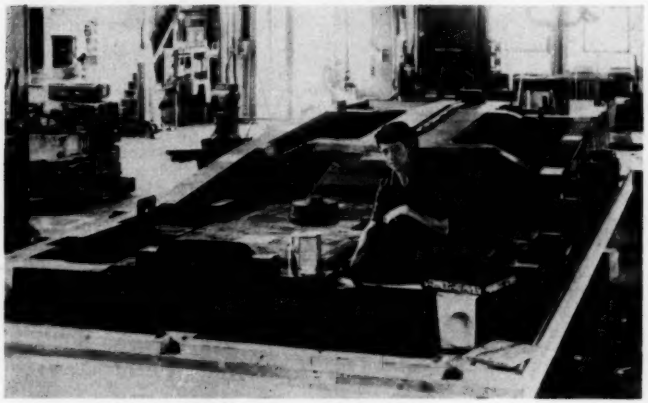
48. Sectional Matchplate Frame

Efficiency Matchplate Co.'s cast aluminum interchangeable matchplate frames enable foundries to convert readily from loose patterns to matchplate molding, using plastic or composition sectional plates. Frame sections are grooved to receive matchplate sections and may be assembled in combinations to permit composite molding. All three sizes can be used in one frame. Divider bars may be removed and full-sized matchplates inserted. Patterns can be inserted, removed or replaced in less than 1 min. Manufacturer claims such advantages as decreased plate and molding costs and increased production. Brass processing frames for casting sectional matchplates are also available from Efficiency Matchplate Co.



49. Strip Chart Recorder

Wheelco Instruments Co.'s new electronically operated Multipoint Capacilog is a deflection-type strip chart recorder that provides up to 6 permanent records on one chart. Direct-reading, non-balancing measuring method achieves ¼ of 1 per cent of scale accuracy in detecting changes in measuring circuit, previously only obtainable through use of potentiometric or null-type systems.

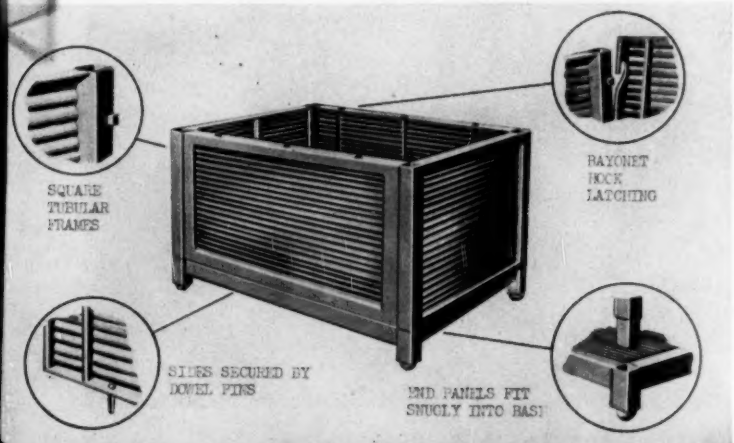


50. Wood Pattern Coating

Carboline Co.'s wood pattern coating is claimed to outlast others by four times as long in foundry service, stands up well under sand slingers, eliminates holes from jabbing of vents, and hardens surface of soft wood patterns to 10 to 15 points below steel, withstands heat to 350 F, does not oxidize, reduces dry rot, and bond to wood is greater than wood fiber to wood fiber.

51. Dual-Purpose Hydraulic Hand Truck

Clark-Hopkins Equip. Co.'s dual-purpose hand truck hydraulically lifts and stacks heavy cases and barrels, weighs only 111 lb., has 500 lb capacity; lifts loads to 54 in.; has rubber wheels and is highly maneuverable.

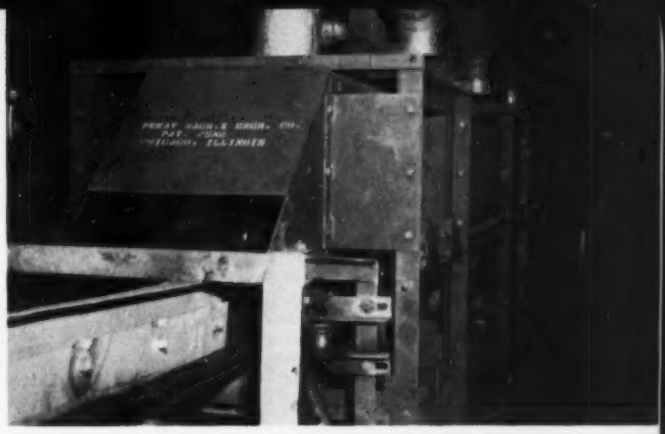


52. Materials Handling Box

Jervis B. Webb Co.'s Hazen Knock-Down Materials Handling Box permits safe, rapid transportation and stacking of empty or loaded boxes in multiple number and has patent nesting features. When empty, 10 units can be knocked down and stored in same space as required for four assembled boxes, enabling four normal freight car loads of filled boxes to be returned empty in one car.

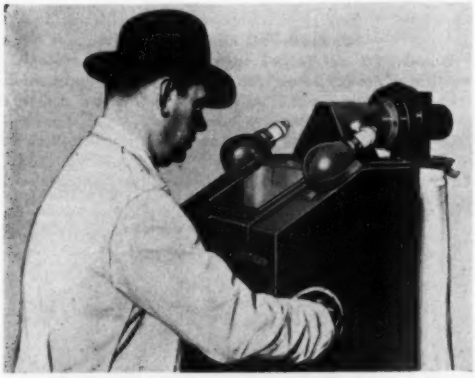
53. Sand Conditioner

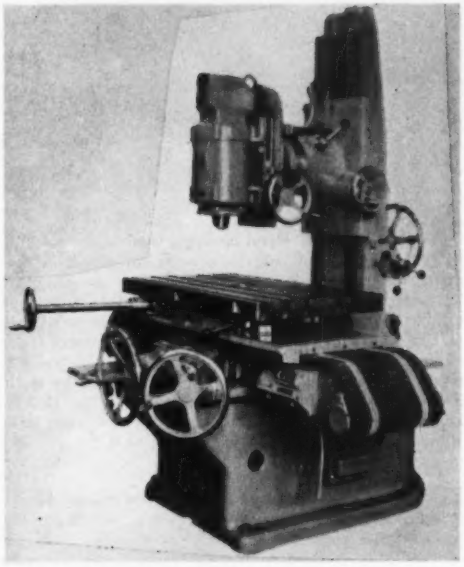
Pekay Machine & Engineering Co.'s Mixer-Muller is claimed by manufacturer to increase output up to 95 per cent, to produce more flowable, lump-free and cooler sand, increase permeability from 100 to 110, up green compression strength from 10.5 to 12 lb, maintain correct moisture content and reduce bonding material by half. Unit is normally 24 ft long by 2 ft high on 12 to 24 ft conveyor belt, is easily installed.



54. Sandblast Cabinet

W. W. Sly Mfg. Co.'s handy sandblast cabinet utilizes either soft abrasives, sand or metal abrasives to clean small parts. Features: Rubber sleeves and attached rubber gloves, exhaust fan and dust bag. Operates by connecting to 110-volt circuit and compressed air line, on any workbench.





55. High-Speed Milling Machines

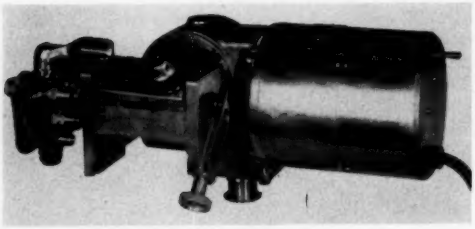
Kurt Orban Co., Inc.'s universal high-speed milling machines, designed for precision patternmaking and machining of all metals, are built in two sizes. Model SF 1 uses manual control for worktable movements and adjustment of power bracket. Model B 3 SFI has an infinitely-variable automatic feed for these operations. Work table is revolving, hand-operated on small model; hand-operated or automatically controlled on larger model. Features: 3 speeds, reversible motor that serves as milling head, convenient controls, backlash-free guide rails.

56. Cupola Lining Refractory Gun

Basic Refractories, Inc.'s BRI Gun A is a pressurized machine conforming in hopper design and construction with ASME unfired pressure vessel code and meters and feeds any dry refractory mix through hose and nozzle against any vertical or horizontal surface rapidly and accurately in any desired volume. Mounted on wheels and usable wherever compressed air is available, gun will make cupola lining patch 1 to 2 in. thick in 15 to 20 minutes.

57. Casting Conveyor ➡

Industrial Engineering & Mfg. Co.'s Universal 500-F Series casting conveyors are available in 6, 8, 10 and 12 ft lengths, with relative maximum elevations of 4'6", 5'8", 6'10" and 7'1". Channel widths 15½". Steel flights are 1½ x ½ x 10¾ in., riveted to 4,400-lb tensile strength open-link chain, fully-protected. ¾ hp motor.



59. Exothermic Riser Compound

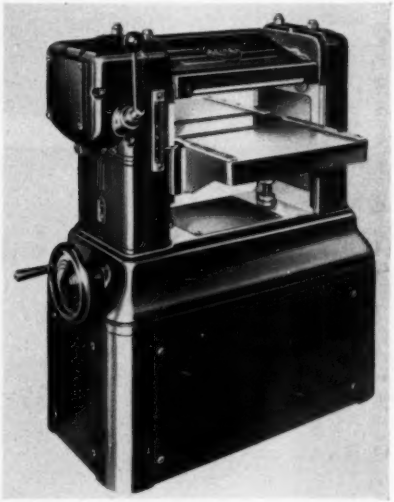
Foundry Services, Inc.'s Feedex, an exothermic compound, which when molded into such shapes as necked-down cores, riser sleeves and bushes, pads, etc., is ignited by incoming metal to create temperatures in excess of 3100 F. Metal can be kept hot for an hour or more, enabling very small risers to feed heavy sections and produce sound castings. Manufacturer claims Feedex reduces cleaning costs and riser size, insures progressive solidification.

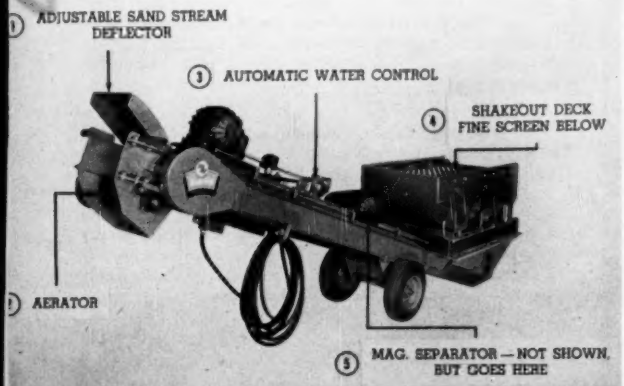
⬆ **58. Metal Spraying Gun**

Metallizing Co. of America's metal spraying gun coats shafts, rolls and machine parts from lathe mounting and features greatly-increased spraying speed. Gun adds metal to metal via fine atomization of wire stock at 6300F with perfect bond and is recommended by manufacturer for reclaiming mis-machined castings and spraying corrosion-resistant metal. Weighing 20 lb, gun is powered by 1/20 hp constant-speed induction motor and will spray No. 15 B & S gage wire up to 3/16 in. diameter. Speeds to 18 lb per hr for aluminum, nickel; to 80 lb per hr for zinc.

60. Single-Surface Wood Planer ➡

Delta Mfg. Div., Rockwell Mfg. Co.'s No. 22-100 13-in., single-surface wood planer handles stock as short as 6 in., unbutted, as wide as 13 in., as thick as 5 in., as thin as 1/16 in. Three-knife cutterhead takes 210 cuts per second, reducing subsequent sanding. Features: totally-enclosed, gears, etc.; fingertip clutch control that stops and starts feed instantly, depth scale readable from any position, individual blade adjustments with simplified measuring device; solid, stress-proof steel cutterhead.



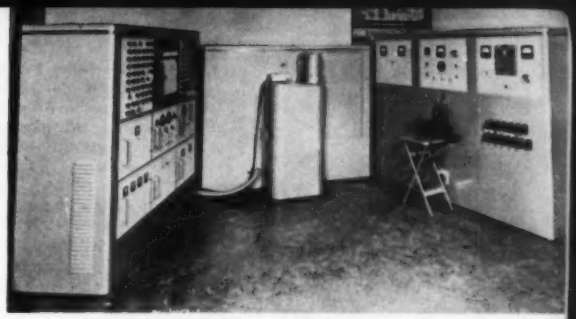


⬅ **61. Automatic Sand Conditioner**

Newaygo Engineering Co.'s Reddy Sandy performs complete shakeout and sand conditioning cycle automatically without hand shovelling. Molds are dumped on vibrating deck, shakeout deck separates sand from castings and cores and drops it onto vibrator for screening. Belt conveys sand past optional magnetic separator, to automatic tempering device that adds water then to built-in aerator that fluffs and cools sand. Can be used in conjunction with Handy Sandy unit, insuring that sand never touches floor from flask sumping to delivery direct to molder.

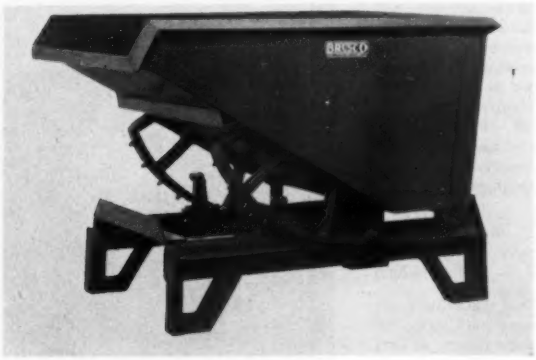
62. Direct-Reading Spectrometer

Applied Research Laboratories' direct-reading spectrometer tests a wide variety of metals and inorganic materials, measuring 25 elements—up to 20 simultaneously. Based on spectroscopic principles, unit also provides pen-and-ink recorded analyses of samples, element by element within 2 min. or less. Recording mechanism produces multiple record copies for high-speed analytical control when desired. Of advanced design, instrument produces results comparable in accuracy to chemical analysis.



63. Bronze and Aluminum Specialty Alloys

Federated Metals Division announces two new specialty alloys. Herculoy Bronze is a copper-silicon alloy with low tin content that has high as-cast properties and excellent corrosion resistance and is available as (1) General Purpose Bronze—used where high-strength and ductility are desired, and (2) Gear Bronze—for use where strength greater than tin bronze is needed. Tenzaloy is an aluminum alloy that ages at room temperature to produce high mechanical properties equivalent to those obtained by solution-treating, quenching, aging conventional heat-treatable alloys. Both Herculoy and Tenzaloy possess unusually high mechanical properties.



64. Carbon Meter

E. Leitz, Inc.'s Blosjo Carbon Meter requires only 2½ minutes to determine carbon content, at the furnace, of samples chill cast from molten steel. Instrument has .04 to .40% carbon range for unhardened steels; .30 to 1.25% for hardened steels. Unit, with self-contained power supply, weighs 34 lb.

65. Self-Dumping Hopper

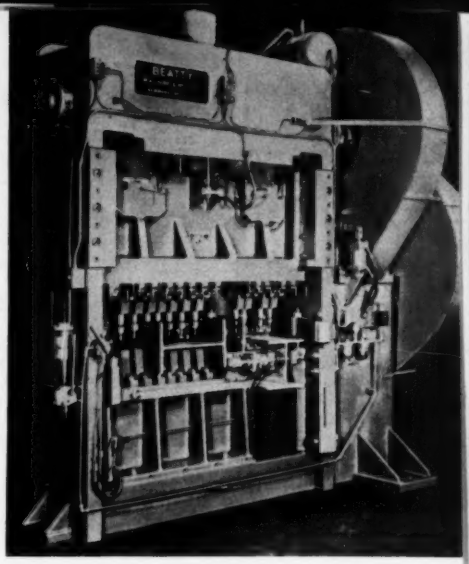
Brummeler Steel Products Co.'s Brusco Automatic Self-Dumping Hopper speeds foundry scrap handling and disposal. Hopper is placed adjacent to work area and fork or pallet lift truck moves unit to dumping area where release is tripped from fork truck, automatically dumping hopper. Capacities range from ½ to 2 cu yd and dimensions from 26 to 44 in. x 24 to 51 in. x 71½ in. x 39 in., with special made-to-order sizes available. Hopper is of 3/16 in. reinforced steel plate. Rocker is one-piece cast iron and hopper and skid are of welded construction.

66. Materials Handling Loader

Tractomotive Corp.'s new wheel tractor materials handling loader features hydraulic torque converter drive and new clutch-type transmission to insure no spinning of wheels, loading in higher gear, improvement of crowding action, and elimination of most gear-shifting. Operator can go forward or reverse with one lever. TL-10 is mounted on rubber tires, has ¾ cu yd hydraulically-controlled bucket, weighs 10,650 lb, and has ample clearance to load average dump trucks. Bucket is over drive wheels to insure positive traction and exceptional maneuverability. Loader has 40.5 brake hp gasoline engine.

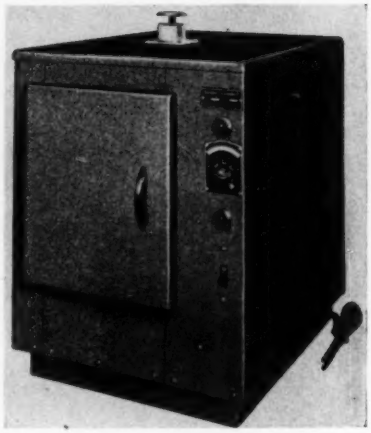
67. Beam Punch ➡

Beatty Mfg. Co.'s Guillotine Beam Punch for punching flanges and web beams 6 in. to 30 in. offers such design advantages as greater rigidity, reduced punch wear, positive alignment, savings in floor space and in manufacturing and freight costs. No. 9 punch shown here will punch four 15/16-in. holes through 11/16-in. mild steel plates. Additional holes are punched by staggering punch stems. Die levels are the same for punching both flanges and webs of beams.



68. Crane ⬅

Orton Crane & Shovel Co.'s special crane is designed for yard handling of packaged units and is claimed by manufacturer to be especially useful where stacks are close to tracks, or where conditions restrict maneuverability or capacity of fork or straddle trucks. Manufacturer claims unit does work of 20-man stacking crew and has effected reduction in materials handling costs as high as 900%.



69. Wetting Compound

Aquadyne Corp.'s "4-Way" Wet Water spreads, diffuses and makes intimate contact with powder-size particles many times faster than ordinary water for dust control and sand conditioning in the foundry. Aquadyne System utilizes ordinary water supply, hooked up to Hydroblender unit which blends it with Aquadyne multiphase wetting compound capsule to provide wet water on tap. Each capsule makes 1,000 gallons of wet water at a cost of less than ½ cent per gallon. Wet water in sand conditioning increases workability, aids blending, eliminates clay balls, reduces mixing time, facilitates molding and ramming and lessens drying time.

70. Laboratory Core Baking Oven ⬆

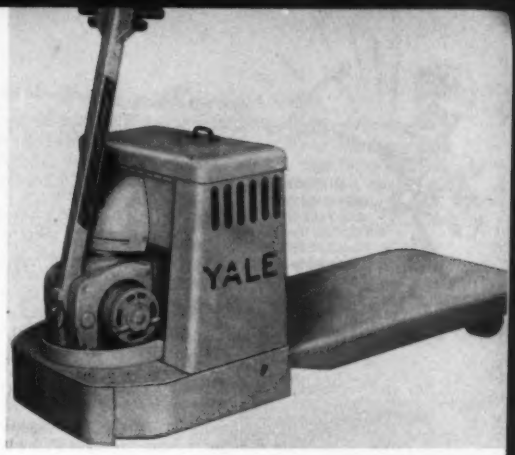
Claud S. Gordon Co.'s foundry laboratory core baking oven has a heavily insulated chamber 10-in. wide, 12-in. high and 18-in. deep designed for maximum temperature of 550 F with sensitive automatic thermostatic control. Special double air diffusion system insures equal amount of air intake at front and back of oven, producing three to four air changes per min.

71. Dump Area Reclaiming ⬅

Standard Reclaiming Company offers a new service to foundries by servicing foundry dump areas for more extensive dumping, and at the same time reclaiming metallics from dump areas by means of a new process.

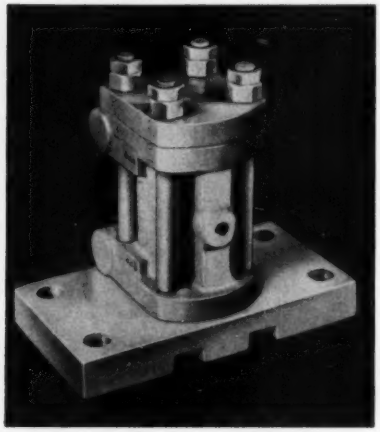
72. Hydraulic Lift Fork Truck

Yale & Towne Mfg. Co.'s new Stubby Worksaver is 6-in. shorter than previous "walkie" type models but retains full platform lengths for handling skids and skid bins. Truck is available in 4,000 and 6,000 lb capacities, in platform lengths ranging from 36 to 72 in. in 6-in. increments, platform widths of 19, 24 and 36 in. Heights of 6, 7, 9, 10 and 11 in. are available for handling skids of varying sizes. Features: hydraulic lift, solenoid flow regulation valve, overload relief valve.



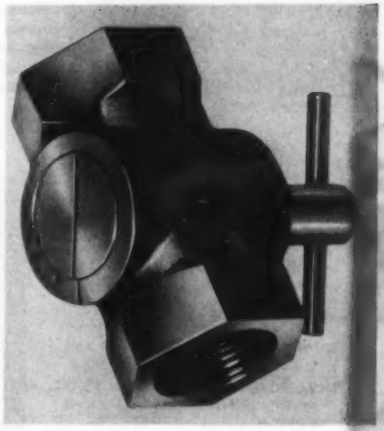
73. Pre-Finish Metal Cleaner

E. F. Houghton & Co.'s acid phosphate cleaner, developed for preparing metal surfaces for painting, lacquering or japanning, conditions metal for final finishing by removing processing oils, rust preventatives, perspiration and soldering residues and depositing smooth dry coating on surface to provide greater adhesion of finishing material. Coating also acts as rust preventative.



74. Vibrator

Cannon Vibrator Co.'s new "Quiet Type" Bin and Hopper Vibrator produces positive, intensive vibration noiselessly, eliminates breakage of bolts and end plates. Furnished by manufacturer in 1⅝ to 4-in. sizes.



75. Flow Valve

Reynold Shaffer Co.'s Flow-Regulating Valve is a stop cock for use where exact setting of regulated flow of liquids is required. Non-leaking, valve can be used for jet and spray pumps or can be used as a by-pass boiler feed line valve.

76. Plastic Core Drier

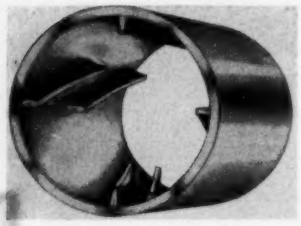
Thermex Division, Girdler Corp., announces an entirely new type of combination core drier and core box base for use with high-frequency core baking equipment. Dri-Box, precision-built of durable plastic, is so dimensionally stable that it can be used as the lower half of core box into which cores are blown directly. Almost indestructible, Dri-Box can be recycled immediately, eliminates core sticking and carbon deposit, and reduces drier requirements to 1/10 or less of conventional oven needs on continuous operating basis. Core breakage is virtually eliminated.

77. New-Design Wheelbarrow

American Conveyor Co.'s Speed-Barrow is claimed by manufacturer to do work of four standard barrows in less time and with less effort. Equipped with pneumatic tires, unit handles easily when loaded, will not tip and requires no lifting to discharge load. Available in two models, with and without discharge gate. Specifications: top body length—42 in., body depth—36 in.; width—21 in., over-all axle length—32 in., height from floor (front)—48 in., height from floor rear—41 in., capacity—1800 lbs.

78. Air Vibrators

Spo, Inc.'s Series 79 Air Vibrators are available in 8 standard sizes with long or standard-stroke pistons for use on hoppers, tables, molding machines, chutes, etc. Used in conjunction with quick acting hopper gate valve, vibrators prevent accidental packing of hopper contents by premature vibration. Available in 2 and 2½-in. piston diameters. All models tapped for ¼-in. rigid or swivel, straight or ell connector for hose.

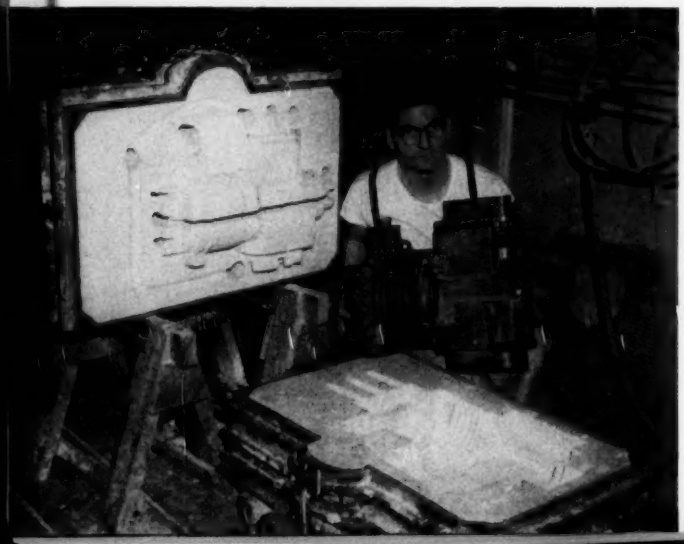


79. Cupola Tuyeres

Jackson Iron & Steel Co.'s Sprow Double Auger Tuyeres feature internal ribs which cause boring action of blast to penetrate farther into the stock and cause highest temperatures in center of cupola, less destruction to lining, uniform melting rate, no slag bridge.

80. Respirator

Mine Safety Appliances Co.'s Compact Comfo Respirator combines functions of two masks by filtering both toxic and nontoxic dusts through media of new and economical mineral wool filtering media. Extremely small filter holder provides for all-round operator vision.

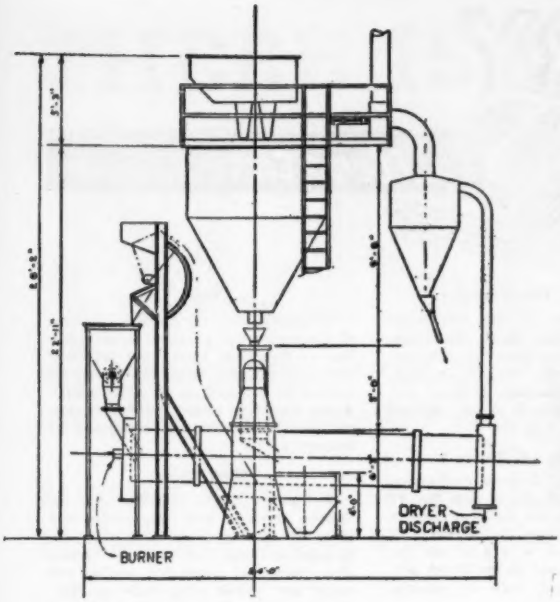


81. Pocket Hardness Tester

A. H. Company's lightweight, low-cost hardness tester is approximately size of a slide rule and is easily operated and read on the job. Conversion charts accompany tester for comparative Rockwell and Brinell readings. Tester can be used in quality spot checks for comparative Go and No Go testings where desired.

82. Metal Casting Plaster

United States Gypsum Co.'s Permeable Metal Castings Plaster for non-ferrous castings produces smooth, permeable molds without special treatment. Shown are a plaster cope and drag for a ½-in. thick casting made with a solid pattern. After making the drag, clay strips were fitted in the cavity and the cope cast.

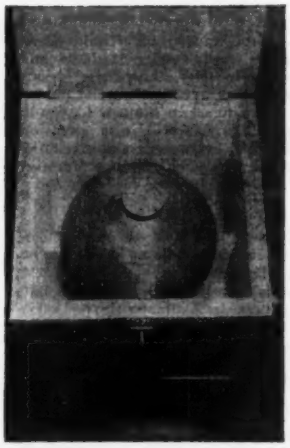


83. Sand Reclamation System

Hydro-Blast Corporation's new standard three-ton-per-hour sand reclamation system diagrammed at left comprises equipment for the following steps: (1) wet lump-breaker (not shown), (2) primary classification, (3) wet sand storage hopper and control feed to scrubber, (4) secondary classification, and (5) dewatering and drying. Sludge removal tank (not shown) completes the system. Floor space occupied is 24 x 24, with height of 28 ft. Dust collector is included in this system, which, manufacturer claims, produces sand superior or equivalent to new sand.

84. Core Oil

Ten characteristics of Penola, Inc.'s Penolyn Core Oil, contributing to production of high-quality cores are: (1) Uniformity—no settling out in drums and tanks; (2) Concentrated Form—high sand to oil ratio; (3) No Obnoxious Odor; (4) No Seepage—will not settle or drain to bottom of sand mix; (5) No Crusting or Green Mix—air dries slowly; (6) Clean Working; (7) Wide Temperature Baking Range—no burn-outs, small and large cores bake simultaneously; (8) Polymerized Formulation—insures maximum strength; (9) Minimum Gas; (10) Ample Collapsibility—fewer cracked castings.



85. Cobalt 60 Container

St. John X-Ray Laboratory's combination shipping and storage container for Cobalt 60 is available in two sizes. In one case solid lead ball is 9-in. diameter, mounted in a 13-in. square wood box, other has 12-in. ball mounted in 20-in. square box. Cavity in ball centers holds Cobalt 60 aluminum capsule snugly. Lead plug closes cavity tightly. Special tongs are furnished to handle the plug in lead ball.

Reader Service (APRIL/51)

AMERICAN FOUNDRYMAN

Please send me detailed information on "Products Parade" and Foundry Literature items circled below.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____ CITY_____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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Reader Service

AMERICAN FOUNDRYMAN

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FOUNDRY Literature

Readers interested in obtaining additional information on items described in Foundry Literature mail postcard below to Reader Service, American Foundryman, 616 S. Michigan Ave., Chicago 5. Refer to items by circling the convenient code numbers.

Strip Chart Recorders

85—Bulletin C2-2 describes Wheelco Capacilog electronically operated strip chart recorders. In addition to explaining direct deflection, wheatstone bridge circuit and pneumatic control, bulletin lists model numbers and specifications of various models. *Wheelco Instruments Co.*

Grinding Wheel Bond

86—4-page folder describes new vitrified bond for grinding wheels. Advantages and applications are given for this new abrasive development, "79E," which, manufacturer claims, increases grinding and finishing output from 5 to 10 per cent. *Chicago Wheel & Mfg. Co.*

Hydraulic Lift Trucks

87—Bulletin 5031 features engineering sketches showing details of new Barrett Hydraulic Lift Trucks. Bulletin contains complete specifications for Model MD hydraulic lift truck with 6-in. lift and 5,000 lb capacity, and Pallet Model MX, with 4-in. lift and 4,000 lb capacity. *Barrett-Cravens Co.*

Tools

88—Catalog No. 18, contains 32-pages of information and prices on the complete line of Severance Tools, plus suggested uses and pertinent technical data on all types of tools described, including midget mills, deburring cutters, tubing cutters, countersinks, reamers, etc. *Severance Tool Industries, Inc.*

Sling Chains

89—Bulletin SC-48 describes line of Sterling wrought iron sling chains and gives full data on chain safety rules, inspection and care, load limits for various chain sizes and suspension angles, and single and double sling chain specifications in tabular form. *Cleveland Chain & Manufacturing Co.*

Universal Testing Machines

90—30-page catalog on Riehle Screw Power Universal Testing Machines and accessories includes illustrations, details of construction, specifications and dimensions of machines up through 400,000 lb capacity. Information is also given on special tools, instruments and accessories for special tests. *Riehle Testing Machines Div., American Machine & Metals, Inc.*

Jolt Pin Lifters

91—4-page illustrated catalog presents detailed information and specifications on six standard models in the Spo Series 5000 line of jolt pin lifters. Dimensions, capacities, pattern draw, vibrator size and other pertinent data are tabulated for quick reference. In addition, photographs and line drawings depict construction and features. *Spo, Inc.*

Hardness Tester

92—Bulletin ET-15 describes the Ernst portable, direct-reading metal hardness tester. By pressing handgrips on sides of instrument, operator obtains immediate, direct, at-the-job Rockwell "A" readings. *Newage International, Inc.*

Fork Trucks

93—8-page descriptive bulletin describes design and construction features of 3000 and 4000-lb capacity fork trucks and contains pictures and descriptions of major components; dimension drawings showing maneuverability; photographs of easy-handling features and 16 different applications in industry; and decriptions of available attachments. *Baker-Raulang Company, Baker Industrial Trucks Div.*

(Continued on Page 174)

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616 S. Michigan Avenue

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Reader Service (APRIL/51)

AMERICAN FOUNDRYMAN

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ALMAG 35

ONLY ONE PRODUCER . . . ACCEPT NO SUBSTITUTES . . . INSIST ON ALMAG 35

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HERE'S ONE ALUMINUM CASTING ALLOY THAT OFFERS ALL THESE ADVANTAGES

- 38,000 to 44,000 p.s.i. Tensile Strength As-Cast.
- 10.0% — 15.0% Elongation in two inches As-Cast.
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- No heat treatment necessary.
- All properties remain constant for life of casting.

***ALMAG 35** is produced exclusively from 99.8% or better virgin aluminum ingot, plus magnesium and small amounts of other alloying ingredients.*

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THE BOOKLET CONTAINS:

A complete discussion of this thoroughbred alloy—a description of its properties, composition, corrosion resistance, machineability and wide range of applications which opens new fields for the aluminum foundry industry. Write for your copy today to. . . .

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Please send your booklet containing all the facts about JOBBINS ALMAG 35.

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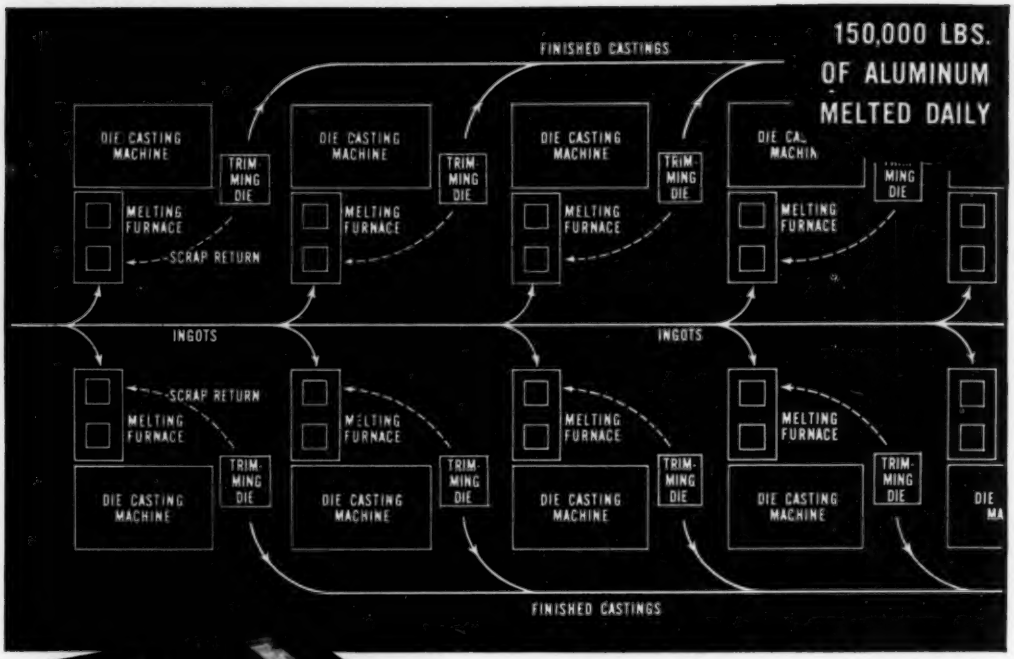
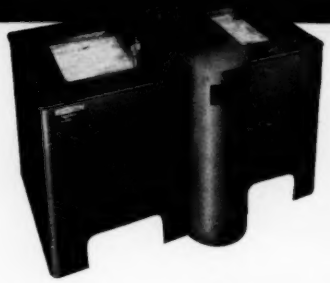




15 LINDBERG 2-CHAMBER FURNACES IN ONE DIE-CASTING PLANT....

One of the nation's newest die-casting plants uses 15 Lindberg Two-Chamber Furnaces in their die casting operations. These furnaces, operating on a 24 hour a day schedule have the capacity to melt 150,000 lbs. of alloy per day. Each furnace serves a separate die casting machine to produce these production advantages . . .

No melting room needed—all metal is melted at the casting machine, eliminating the need for carrying hot metal through the plant.

No scrap sorting—scrap metal and reject castings never leave the machine, allowing the use of a different alloy in each machine if necessary, while completely eliminating scrap sorting, handling and identification problems.

Unified production unit—each die casting machine becomes a unified production unit—receiving cold alloy ingot, melting, holding, casting, inspecting, reclaiming scrap metal and reject castings—delivering only the finished casting to the production line. Obviously the savings realized are spectacular.

LINDBERG-Fisher MELTING FURNACES

Lindberg Engineering Co., 2463 W. Hubbard Street, Chicago 12, Illinois

WHEELABRATOR

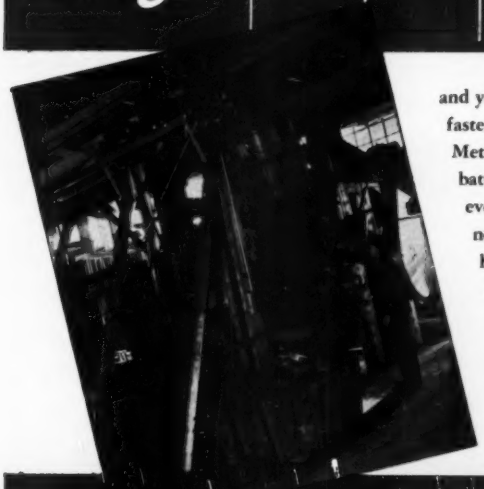
AIRLESS BLAST CLEAN

PER YEAR
For GENERAL METALS CORP.
Los Angeles, Calif.

COST COMPARISON CHART	WHEELABRATOR METHOD	FORMER METHOD
MACHINE	36" x 42" Wheelabrator Tumblast (11½ cu. ft. capacity) 48" x 48" Wheelabrator Tumblast (20 cu. ft. capacity)	Battery of tumbling mills and airblast rooms
PRODUCTION	400 tons per month	100 tons per month
LABOR REQUIREMENTS	1 man, 8 hours daily	2 men, 8 hours daily 16 man hours
COST PER TON	$3.40	$8.41

savings

cleans four times the work —with half the labor



Compare RESULTS and you will see that Wheelabrator Airless Blast Cleaning is the fastest and most economical method in use today. At General Metals Corp., two Wheelabrator Tumblasts replaced a whole battery of tumbling mills and airblast rooms and saved $99.19 every day. The Tumblasts clean so much faster that one man now handles 400 tons a month where two men previously handled only 100 tons monthly. Because the castings are cleaner, customers of the General Metals Corp., report that they are saving over 50% in tool life.

Why pay a premium on cleaning machines that only half-clean your work? Let Wheelabrator prove its cost-reducing advantages to your satisfaction. Write today for details.

A.F.S. Student Chapter members and instructors photographed at work in Oregon State College's Metals Casting Laboratory are (left photo) Roy Hathaway, Instructor David Crabtree, Dwight Averill and Instructor James Smith tapping cupola into a covered cylindrical ladle. Center photo: Student Bruce Linkous at work in the Sand Control Laboratory. Right photo: Prof. Smith and Student Averill pouring mold.

CHAPTER ACTIVITIES NEWS

Texas

C. L. Boone
Texas Steel Co.
Chapter Reporter

JANUARY MEETING, held at the Blackstone Hotel, Fort Worth, had the largest regular meeting turnout of the year, with some 76 members and their guests attending.

The motion picture, *"Men and Molds,"* was shown and a discussion period followed the film, in which many new foundry ideas were presented, and from which all foundrymen present benefited greatly. A wide range of problems was covered including types and preparation of molding sands, gating and risering, etc.

Philadelphia

G. H. Bradshaw
Philadelphia Naval Shipyard
Chapter Vice-Chairman

FEBRUARY 9 MEETING was attended by 150 foundrymen and their guests, who heard A.F.S. National Director Fred G. Sefing, International Nickel Co., New York, speak on activities of the American Foundrymen's Society.

Preceding Mr. Sefing's talk, William Pollock, a member of Philadelphia's Charter Committee, spoke on the committee's work in training Philadelphia youth to become better citizens.

Evening's technical speaker was Michael Bock, II, Exomet, Inc., who gave an interesting talk illustrated with slides on the use of insulating and exothermic materials as applied to modern foundry practice. Meeting technical chairman was Arthur Thum of Palmyra Iron Foundry.

Northern California

J. M. Snyder
Jos. Mustos Sons—Keenan Co.
Publicity Chairman

FEBRUARY 16 MEETING saw A.F.S. Technical Director S. C. Massari narrate the sound-color motion picture *"Fluid Flow in Transparent Molds—II"* at the Hotel Shattuck, Berkeley.

The narrator, S. C. Massari, watched the film during its various stages of development during the three years required to make it. The new film provides a graphic illustration of the development of sprue, pouring box, horizontal runner and gate systems for attaining castings with maximum external and internal soundness. The film was made at Battelle Memorial Institute, Columbus Ohio, under the auspices of the A.F.S. Aluminum & Magnesium Division Research Project, and shows how gases and gating geometry effect the metal.

Chicago

Dean Van Order
Burnside Steel Foundry Co.
Chapter Reporter

FEBRUARY MEETING had as its chief speaker Frank G. Steinebach, Penton Publishing Co., Cleveland, who spoke on *"What's Ahead."*

Mr. Steinebach emphasized the work being done to get men from industry into some of the responsible jobs in government so that industrial problems can be analyzed. With present production plans as outlined by the Government it is going to be increasingly hard to purchase certain supplies such as copper, coke, aluminum, alloys etc., and as more controls are placed on materials a controlled expansion plan is going to be needed, he said.

Mr. Steinebach mentioned three possible sources of action that could be followed by employers who are faced with certain shortages—(1) See your local National Production Authority Office; (2) See the Military Ordnance Department; and (3) See that customers who have prime contracts are notified.

He also said that repair parts for machinery are becoming increasingly hard to obtain, in fact, in many cases it is easier to obtain new machines than spare parts. Foundries would do well

to set up an efficient system of preventive maintenance, he added.

Frank Hall, Beardsley & Piper Div., Pettibone Mulliken Corp., entertained foundrymen with some amateur magic tricks in the use of molding and core sand in the foundry.

Quad City

E. C. Zirzow
Deere & Co.
Publicity Chairman

SPEAKER at the February 19 meeting was E. Eugene Ballard of Lester B. Knight & Associates, Chicago, who addressed the group on *"The Modern Foundry—Design, Operation, Maintenance."*

Mr. Ballard outlined several general plans of mechanization which his company had installed in various foundries, and suggested mechanization as a means of increasing production in comparatively small foundries of limited working or floor area. He further stressed the necessity of good housekeeping and the role it plays in good foundry operation.

The speaker outlined several methods of obtaining a good materials flow through the foundry and stressed the economies in labor which are obtained when all unnecessary materials handling is eliminated.

He advised that all equipment be inspected regularly and that it be replaced when it is beyond repair, and warned of predicted shortages of equipment during the defense program.

St. Louis District

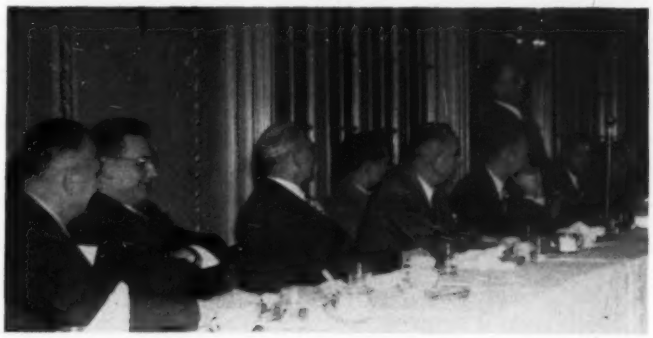
N. L. Peukert
Carondelet Foundry Co.
Chapter Reporter

FEBRUARY 8 MEETING featured awarding of prizes to winners of the Chapter's Apprentice Contest, and a talk by Bernard N. Ames, New York Naval Shipyard, Brooklyn, on *"Plastic Bonded Thin Shell Molds."*

The speaker said the Navy has taken a great interest in this new molding process, and has supported a great deal of investigation work on this subject. The Navy is at present setting up a production line using the thin shell process, this process being the same as the "C" or Croning process, primarily utilizing a resin-bonded sand mixture. The mixture found to be suitable for most metals is roughly 92 parts silica sand with a grain fineness of 100-150 and 8 parts of a pulverized phenolic formaldehyde two-stage setting resin.

The first stage setting occurs as the dry mixture is poured on a metal pattern heated to approximately 400F. The second stage setting takes place in an oven heated to approximately 600F. The dried mold is then placed

Foundry notables at Northwestern Pennsylvania Chapter's February 9 meeting included, left to right: Norman J. Birch, American Brake Shoe Co., Mahwah, N. J., technical speaker; Dr. Herman Offner, Edenboro College, Edenboro, Pa., after-dinner speaker; J. W. Grewell, Westinghouse Electric Company; and Joseph Hornstein, Meadville Malleable Iron Company.



View of speakers' table at Northeastern Ohio Chapter's February 8 meeting, with "Coffee Talker" Charles McHugh, Thompson Products, speaking.

Looking satisfied with "a good job well done" were these members of Western New York Chapter's Stag Party Committee. Seated, left to right: William Taylor, Marvin Taublieb, Joseph Zahm and Roger Walsh. Standing, L. C. Roberts, A. J. Heysel, J. R. Wark, Henry Sproull, Louis Rodenbach. (Photograph courtesy of Avitus J. Heysel, E. J. Woodison Company).

Snapped during Northeastern Ohio Chapter's February 8 meeting were, left to right: William Marshall of Ley's Malleable Castings Co., Ltd., Derby, England; NEO Chapter President Fred J. Pfarr, Lake City Malleable Co., Cleveland; and Jack Hill, also of Ley's Malleable Castings Co., Ltd. Messrs. Marshall and Hill, are visiting U. S. foundries to study production methods. (Photo: Thomas Gallagher, Lake City Malleable Co.)

Ford Motor Co. foundrymen attending Detroit Chapter's February meeting at Rackham Memorial included E. E. Harkness (left) and H. G. McMurry. (Photo courtesy of Walter W. Ring, Cadillac Motor Car Division, GMC.)

Enjoying dinner prior to Southern California Chapter's February meeting were, left to right: John P. Swaino and Martin C. Robinson of Malleable Fittings Corp., Joseph Baron of Pacific Cast Iron Pipe & Fittings; and Harold G. Gangloff, Stanley Foundries, all of Los Angeles. (Photograph courtesy of Kenneth F. Sheckler, Calmo Engineering Corp., Los Angeles.)

in a jacket with a suitable back-up material holding it together. The back-up material found to be most satisfactory is metal shot.

Mr. Ames brought out the remarkable insulating effect that resin-bonded shell has on metal. It is much greater than green sand regardless of the back-up material used for the shell mold, he said. Another point proven by the Navy investigation of this process is its suitability to all types of metals. The Navy poured castings using high alloy steels and lower melting aluminum alloys.

Bronzes seemed to be the most troublesome, both in finish and soundness, but with different gating techniques suitable bronze castings were produced.

In summarizing, Mr. Ames classed aluminum and gray iron as being not so sensitive to shell molding. Next he rates steels, and third, as being the most sensitive, bronze.

Mr. Ames' talk was very well presented, and it was aided by use of well-developed slides. He also brought along some finished molds, which were passed around to be inspected by the foundrymen present.

Central Indiana

Paul V. Faulk
Electric Steel Castings Co.
Chapter Reporter

MARCH 5 MEETING was held at the Athenæum Turners, Indianapolis, with Gordon W. Johnson, Armour Research Foundation, Chicago, speaking on *"Thermal Properties of Molding Materials,"* in which he presented a comprehensive study of the subject, explaining composition and uses. Some molding materials, Mr. Johnson said, have higher insulating qualities than sand, while others chill faster.

Among points brought out by the speaker were: zircon sand has a cooling rate about 35 per cent greater than that of silica sand and can be used in some instances to replace chills; thermo-maquisite in most cases is not as good as sand and has a tendency to scab and erode; and the addition of silver-lead to any synthetic sand improves such mechanical properties as grain refinement, elongation and tensile strength.

Central New York

James W. Ogden
Cleveland Tramrail Syracuse Co.
Publicity Chairman

MARCH MEETING was held at the Onondaga Hotel Roof Garden, Syracuse, and featured a showing of the A.F.S. Sound-Color Research Film, *"Fluid Flow in Transparent Molds, —II"* with A.F.S. Technical Director narrating the film.

Mr. Massari first presented a brief

resume of the A.F.S. Aluminum Magnesium Research Committee's activities to date, stating that the film we were to see was the second progress report on a research project initiated and sponsored by the Aluminum and Magnesium Division of A.F.S. with assistance from the Battelle Memorial Institute.

We then witnessed a very interesting film in color with sound pickup, and Mr. Massari as narrator. This latest film illustrated the results of the work conducted between October 1947 and June 1950. It showed the development of the pouring box, sprue and horizontal runner and gate systems, using transparent plastic molds and water. Some of the work was recorded in slow motion so that the flow of the liquid in the mold could be more clearly observed. It clearly demonstrated that the gating system should be designed so that it can be quickly filled with molten metal before any liquid enters the mold cavity to obtain sound castings.

The research work to date has produced the latest recommendations for making sound castings, of placing the runner in the drag and the gates and mold cavity in the cope. All work to date has been done in the flat low height castings.

Discussing a casting defect at Detroit Chapter's February meeting were, left to right: Ralph Boyd, City Pattern Foundry & Machine Co.; O. F. Carpenter, Packard Motor Car Co.; and R. Chris Zanison, City Pattern Foundry & Machine Co. (Photo: W. W. Ring, Cadillac Motor Car Co.)

Cincinnati District

Marvin L. Steinbach
Lunkenheimer Co.
Chapter Reporter

FEBRUARY DINNER MEETING featured a talk by O. J. Myers, Archer-Daniels-Midland Co. (The Werner G. Smith Co. Division), Minneapolis, on the subject of *"Cores."* Following dinner two excellent films were shown through the courtesy of the Cincinnati Milling Machine Co.

Mr. Myers then presented his illustrated talk on *"Cores."* With the aid of slides, Mr. Myers led his audience on a "visual tour" of his company's laboratory at Minneapolis. Various instruments and pieces of equipment were explained.

Core sand additions were historically and technically outlined by the speaker and interesting results of experiments on phenolic-formaldehyde resins, urea-formaldehyde resins and oil type additions were shown.

Baking cycles illustrating effects of material, time, temperature, moisture content, mass, furnace atmosphere, etc. were presented. An enthusiastic discussion concluded the session.

Tablemates at dinner preceding Texas Chapter's January meeting were, left to right from far end of table: E. L. Laminack and B. V. Thompson, Jr., Texas Steel Co., Fort Worth; Paul Renegar, McKinley Iron Works, Fort Worth; W. H. Lyne, Hughes Tool Co.; John M. Bird, American Brass Foundry, Fort Worth; John Collier, Garrot Brass Foundry & Machine Co., Houston; and W. R. Sanders, American Manufacturing Co., Ft. Worth.

Detroit

R. Grant Whitehead
Claude B. Schneible Co.
Chapter Reporter

MARCH MEETING, held at the Leland Hotel, Detroit, was designated "Old Timers and Apprentices Night." Many foundry veterans and two tables of apprentices were present.

A canvass before dinner revealed a double octet of full-blooded Irishmen, who honored us with "When Irish Eyes are Smiling". Among the guests present, introduced by Chairman Jess Toth, Harry W. Dietert Co., were N. E. Philtot, project manager, Economic Cooperation Administration and a team of Danish foundrymen who have been visiting foundries in the United States.

Willard E. Kidwell, Packard Motor Car Co., chairman of the Apprentice Contest Committee, announced the winners of the Apprentice Pattern Making Contest and presented them with gift certificates and trophies.

Divisional winners are:

Metal Patternmaking—First place awarded to Joseph E. Collins of the Packard Motor Company, who has been an apprentice since February, 1947. He is expecting to complete his training this year, is 22 years of age, and placed second last year.

Second place was awarded to Richard J. Swartz of Cadillac Motor Di-

vision, GMC. He began his apprentice training in March of 1949, expecting to complete his training in July, 1952. His age is 20 years.

Third place was awarded to Robert E. Bloch of Cadillac Motor Division, who began his training in November, 1949, and will complete the course this year. He is also 20 years of age.

Wood Pattern Division: First place was awarded to Edward V. Young, of the Ford Motor Co., who began his training in April, 1946, and will complete the course in July of this year. He is 22 years of age.

Second place was awarded to James P. Hosey of Ford Motor Co., who began his apprentice training in May, 1947, and will complete the course in July of this year. He is a Navy veteran of two years and is 24 years of age.

Bernard N. Ames, New York Naval Shipyard, Brooklyn, speaking on "Plastic Bonded Thin Shell Molds" at St. Louis' February 8 meeting.

Third place was awarded to Charles Hands of Century Pattern Works, who has been an apprentice for approximately two years and is 21 years of age.

Each of the boys turned in a fine piece of work and those who did not win should not be discouraged if they did not place this year, because the experience gained this year will be of great value to them in next year's contest. The judges had anything but an easy time in awarding placement.

Certificates were awarded to those firms sponsoring the winning apprentices in each division, and were accepted by Paul Copeland, Ford Motor Co., and O. F. Carpenter of Packard Motor Car Co. The Chapter urges each firm sponsoring contestants to keep up the good work.

Irving Oakes of Dostal Foundry and Machine Co., Pontiac, and Fred L. Bretz of Aluminum Company of America, Detroit, won free dinners by enter-

FUTURE CHAPTER MEETINGS

● APRIL 13

TRI-STATE
Tulsa, Okla.
HERMAN L. SMITH
Federated Metals Div., American Smelting & Refining Co.
"Melting and Pouring of Copper-Base Alloys"

PHILADELPHIA
Engineers Club, Philadelphia
J. D. JAMES
Cooper-Bessemer Corp.
"Nodular Iron"

TEXAS
Lufkin, Texas
BRUCE L. SIMPSON
National Engineering Co.
"Development of Metal Castings Industry"
PLANT VISITATION

CENTRAL NEW YORK
Ithaca, N. Y.
ELMER C. ZIRZOW
Deere & Co.
"Sand"

● APRIL 16

OREGON
Heathman Hotel, Portland
CHARLES LOCKE
Atlas Foundry & Machine Co.
Subject to be announced.

QUAD CITY
Ft. Armstrong Hotel, Rock Island, Ill.
A. LESLIE GARDNER
Pangborn Corp.
"Advancement of the Mechanized Blast Cleaning Department"

● APRIL 18

CENTRAL MICHIGAN
Hart Hotel, Battle Creek
W. H. JOHNSON
Naval Research Laboratory
"Gating & Risering"

● APRIL 19

DETROIT
Rackham Memorial, Detroit
BRUCE L. SIMPSON
National Engineering Co.
"Development of the Metal Castings Industry"

● APRIL 27

CHESAPEAKE
Engineers Club, Baltimore
R. A. COLTON
American Smelting & Refining Co.
CARL A. ZAPFFE
Consulting Metallurgist
"Reducing vs. Oxidizing Atmospheres for Bronze Melting"

WASHINGTON
Tacoma, Wash.
R. G. PRICHARD
Atlas Foundry Co.
"The Patternmaker and the Foundry"

● APRIL 30

NORTHWESTERN PENNSYLVANIA
Moose Club, Erie
DONALD LEVELLE
American Smelting & Refining Co.
"Aluminum Casting Defects and Their Correction"

● MAY 4

WESTERN NEW YORK
Sheraton Hotel, Buffalo
A.F.S. Sound-Color Research Film: *"Fluid Flow in Transparent Molds—II"*

Winners of St. Louis District Chapter's 1951 Apprentice Contest, held in preparation for the National A.F.S. Contest, are, left to right: Elwood Hey, Progressive Pattern Co. (3rd, Metal Patternmaking); Raymond Kastrup, Consolidated Pattern Co. (2nd, Wood Patternmaking); John Ashlolt, American Steel Foundry Co. (1st, Wood Patternmaking); Richard Bowman, American Car & Foundry Co. (2nd, Gray Iron Molding); Chapter Apprentice Contest Chairman F. W. Burgdorfer, Missouri Pattern Works; William Burkholder, Central Pattern Co. (1st, Metal Patternmaking); Russell Elze, Central Pattern Co. (2nd, Metal Patternmaking); and Allen Schroeder, National Bearing Metal (1st, Non-Ferrous Molding). Not shown in photo is Howard Wideman, Semi Steel Casting Co. (1st, Gray Iron Molding).

FUTURE CHAPTER MEETINGS

● MAY 7
CENTRAL INDIANA

Athenaeum, Indianapolis
HARRY E. GRAVLIN
R. W. GARDNER
Ford Motor Co.
Film: *"Iron Ore to Motive Power"*

METROPOLITAN

Essex House, Newark, N. J.
L. W. EASTWOOD
Battelle Memorial Institute
A.F.S. Sound-Color Research Film: *"Fluid Flow in Transparent Molds—II"*

WESTERN MICHIGAN

Cottage Inn, Muskegon
O. J. MYERS
Archer-Daniels-Midland Co. (The Werner G. Smith Co. Division)
"Core Sands and Binders"

● MAY 8
TWIN CITY

Covered Wagon, Minneapolis
K. W. Haagensen
Allis-Chalmers Mfg. Co.
"What Kind of a Salesman Are You?"

● MAY 10
ST. LOUIS DISTRICT

York Hotel, St. Louis
Film: *"Iron Ore to Motive Power"*
ANNUAL BUSINESS MEETING

● MAY 11
EASTERN CANADA

Mount Royal Hotel, Montreal
ANNUAL MEETING AND AWARDING OF PRIZES

● MAY 14
CINCINNATI DISTRICT

Engineering Society, Cincinnati
E. F. CHITTENDEN and GEORGE ZANG
Unitcast Corp.
"Let's Pretend"

CENTRAL OHIO

Chittenden Hotel, Columbus
H. O. DAVIDSON
Ohio State University
"Job Simplification"

● MAY 17
DETROIT

Cadillac Motor Car Co., Cadillac, Mich.
PLANT VISITATION NIGHT

● MAY 21
QUAD CITY

Ft. Armstrong Hotel, Rock Island, Ill.
F. G. STEINEBACH
Penton Publishing Co.
"What's Ahead"

● MAY 23
CENTRAL MICHIGAN

Hart Hotel, Battle Creek
WALTER HUMMEL
Campbell, Wyant & Cannon Foundry Co.
"Costs and Human Relations"
NATIONAL OFFICERS' NIGHT

● MAY 24
NORTHEASTERN OHIO

Tudor Arms Hotel, Cleveland
PAST PRESIDENTS' AND NATIONAL OFFICERS' NIGHT

Receiving congratulations and a gift from the Toledo Chapter during its February meeting is Richard L. Westerman, Mayer Pattern Co., Bryan, Ohio, first man in 30 years to complete pattern apprentice training in Williams County, Ohio, and one of the first to complete apprentice training under the G. I. Bill of Rights in the Toledo area. Flanking Mr. Westerman at left is his employer, J. C. Mayer of Mayer Pattern Co., and R. C. Van Hellen, Unitcast Corp., secretary-treasurer of Toledo Chapter.

ing close guesses at the number of corn kernels in the jar.

A very interesting poll was conducted to find the oldest active pattern maker present and to find the member having held membership in A.F.S. the longest. Fred Heiden of the Ford Motor Co., 76, has worked at the patternmakers' trade for 57 years. Claude B. Schneible, Claude B. Schneible Co., has been a member of the A.F.S. for 32 years.

Both men were presented with a set of Chapter bookends. Vice-Chairman Vaughan C. Reid introduced guest speaker, L. H. Kinney of the Chrysler Corporation, who delivered a very interesting talk on *"Modern Pattern Materials and Processes"*.

Michael Bock, II, Exomet, Inc., was Philadelphia Chapter's February 9 speaker. Mr. Bock's subject was "Use of Insulating and Exothermic Materials in the Foundry."

Northwestern Pennsylvania

Earl M. Strick
Erie Malleable Iron Co.
Chapter Secretary

PRINCIPAL SPEAKER at the February 26 meeting was J. E. Rehder, Canadian Bureau of Mines, Ottawa, Ont., who spoke on *"Malleable Foundry Metallurgy."* Designated as Malleable Foundry Night, the meeting drew the largest attendance of the year—130 members and guests, including groups from Erie Malleable Iron Co., General Electric Co., Meadville Malleable Iron Co. and Lake City Malleable Iron Co., Ashtabula, Ohio.

Mr. Rehder covered the subject of melting and annealing of malleable iron thoroughly, bringing out many important elements detrimental to good malleable foundry practice. He stated that over the years there has been considerable talk about oxidation of iron, but no one to date has been able to say definitely what oxidized

This group of Southern California foundrymen took time off during the Chapter's February 9 meeting to be snapped by Chapter Photographer Ken Sheckler, Calmo Engineering Corp. Left to right: James Barr, Compton Foundry; A.F.S. Technical Director S. C. Massari, speaker of the evening; Henry Howell, Howell Foundry; Stanley Jackson, Electro Metallurgical Div., Union Carbide & Carbon Corp.; Arthur Falk, Centrifugal Castings Company; and L. J. Andrews, Griffin Wheel Company, Los Angeles.

Part of group attending Northwestern Pennsylvania's February 9 meeting.

Speakers' table occupants at Cincinnati District Chapter's February meeting included, left to right: J. S. Schumacher, Hill & Griffith Company; Speaker O. J. Myers, Archer-Daniels-Midland Co. (The Werner G. Smith Co. Div.); Treasurer H. R. Rost, Semet Solvay Div., Allied Chemical & Dye Corp.; Chairman Martin E. Rollman, Cincinnati Milling Machine Co., and Chapter Secretary Burt A. Genthe of the S. Obermayer Co., Cincinnati.

malleable iron is, and that there have been numerous theories and so-called remedies but none have been proven. He said that much care must be taken as to the use of various alloys for stabilizers because much difficulty can be encountered, especially in uses of aluminum, chromium, and tellurium. Mr. Rehder said that much trouble is being anticipated by the malleable industry regarding irons with extraordinary high sulphurs, but that the old theory of sulphur over 0.07 or 0.08 being detrimental to the iron has been licked by manganese additions.

Additions to the melt, the speaker said, should be given ample time to dissolve and should be puddled, otherwise there is danger of mottling. Other melt factors discussed included silicon pick-ups from refractories, because of their effect on the fluidity of iron.

Following Mr. Rehder's presentation, a very interesting discussion period followed with nodular iron being one of the subjects.

Entertainment was in the form of a quiz program between two teams—General Electric and Erie Malleable Iron Company—with the former coming out victorious by a few points.

The Chapter bade Harold Lolly, one of its directors, farewell. Mr. Lolly has resigned his job as foundry superintendent of the Erie Plant, Bucyrus-Erie Co., and moved to Pittsburgh, Pa., where he has joined the Rosemont Foundry staff.

Chapter Chairman Frank Volgstadt, is receiving congratulations from the group on his promotion to assistant sales manager of Griswold Manufacturing Co., Erie, Pa.

Fred Pfarr, Lake City Malleable Iron Co., Cleveland, and chairman of the Northeastern Ohio Chapter, was a guest at this meeting and he extended an invitation to the group to attend the Ohio Regional Foundry Conference in March.

Southern California

E. L. Jackson
Electro Metallurgical Div., Union Carbide & Carbon Corp.
Publicity Chairman

Large attendance turned out for the February 9 meeting at the Rodger Young Auditorium, Los Angeles, to see the A.F.S. Research Film, "Fluid Flow in Transparent Molds—II."

Guest speaker, S. C. Massari, A.F.S. Technical Director, described objectives of the study and pointed out that the project should be of vital interest to all foundrymen, whether in the nonferrous or ferrous casting field.

The pictures exhibited the reasons for gas aspiration in flowing metal, and the entrapment of gas pockets

(Continued on Page 177)

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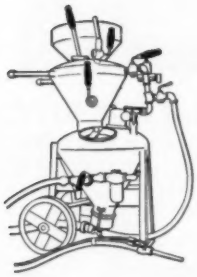

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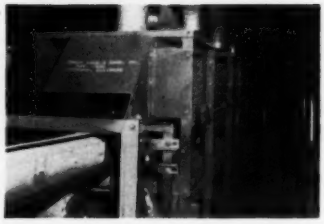

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(Continued from Page 74)

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American Colloid Co., Chicago.
American Steel Foundries, Chicago.
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Apex Smelting Co., Chicago.
Atlas Foundry Co., Detroit.
Barth Smelting Corp., Newark, N. J.
C. O. Bartlett & Snow Co., Cleveland.
Bendix Aviation Corp., South Bend, Ind.
Bethlehem Steel Co., Bethlehem, Pa.
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Buckeye Iron & Brass Works, Dayton, Ohio.
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State Foundry & Machine Co., Cedar Grove, Wis.
Symington-Gould Corp., Depew, N. Y.
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(Concluded on Next Page)

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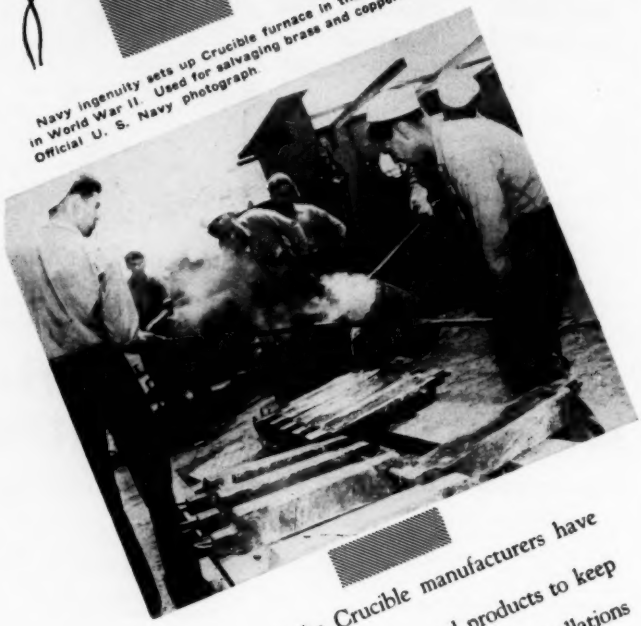

Navy ingenuity sets up Crucible furnace in the field in World War II. Used for salvaging brass and copper. Official U. S. Navy photograph.

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Warren Pipe Co. of Massachusetts, Inc., Easton, Pa.
Werner G. Smith Div., Archer-Daniels-Midland Co., Cleveland.
Woodruff & Edwards, Inc., Elgin, Ill.
Webster Manufacturing, Inc., Tiffin, Ohio.
Warren Foundry & Pipe Corp., Easton, Pa.

New England Founders Hear Strathern

EIGHTY MEMBERS and guests of the New England Foundrymen's Association heard Wallace G. Strathern, Eastern Gas & Fuel Associates, Boston, discuss *"It's Time To Sell—The American Free Enterprise System"* at their March 14 meeting.

Using colored films and charts to illustrate his talk, Mr. Strathern outlined American progress in the last 150 years, comparing it with that of other nations, and showed that the United States has 85 per cent of the world's automobiles, 50 per cent of its hospital beds, 92 per cent of its bathtubs, 48 per cent of the world's radio sets and 52 per cent of its high school students. In conclusion, Mr. Strathern said that it is time to sell the American Free Enterprise System and its freedoms to the world and its peoples.

Future Meetings and Exhibits

55th Annual Foundry Congress, American Foundrymen's Society, Buffalo, N. Y., Apr. 23-26.

BRITISH INDUSTRIES FAIR, London and Birmingham, England, Apr. 30-May 11, 1951.

AMERICAN SOCIETY FOR QUALITY CONTROL, annual convention, Hotel Cleveland, May 23-24.

FRENCH FOUNDRY ASSOCIATION, foundry congress, Paris, France, June 4-6.

INSTITUTE OF BRITISH FOUNDRYMEN, foundry congress, Newcastle-on-Tyne, England, June 12-15.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting, Chalfonte-Haddon Hotel, Atlantic City, N. J., June 18-22.

MALLEABLE FOUNDERS' SOCIETY, annual meeting, the Homestead, Hot Springs, Va., June 22-23.

INTERNATIONAL FOUNDRY CONGRESS, Brussels, Belgium, Sept. 10-14.

INSTRUMENT SOCIETY OF AMERICA, national conference and exhibit, Sam Houston Coliseum, Houston, Texas, Sept. 10-14, 1951.

TEXAS REGIONAL FOUNDRY CONFERENCE, sponsored by A.F.S. Texas Chapter, and Texas A. & M. Student Chapter, Shamrock Hotel, Houston, Texas, Oct. 19-20.

PERSONALITIES

(Continued from Page 115)

nounced at the Society's meeting were the reelection of Mr. Shartle as president, and the election of **G. Rhoads Casey,** Treadwell Engineering Co., Easton, Pa., as vice-president, and of **H. A. Forsberg,** Continental Foundry & Machine Co., East Chicago, Ind., as a director and executive committee member. Other 1951 directors elected were: **James S. Thomson, Jr.,** Symington-Gould Corp., Depew, N. Y.; **John B. Fleeger,** Oklahoma Steel Cast-

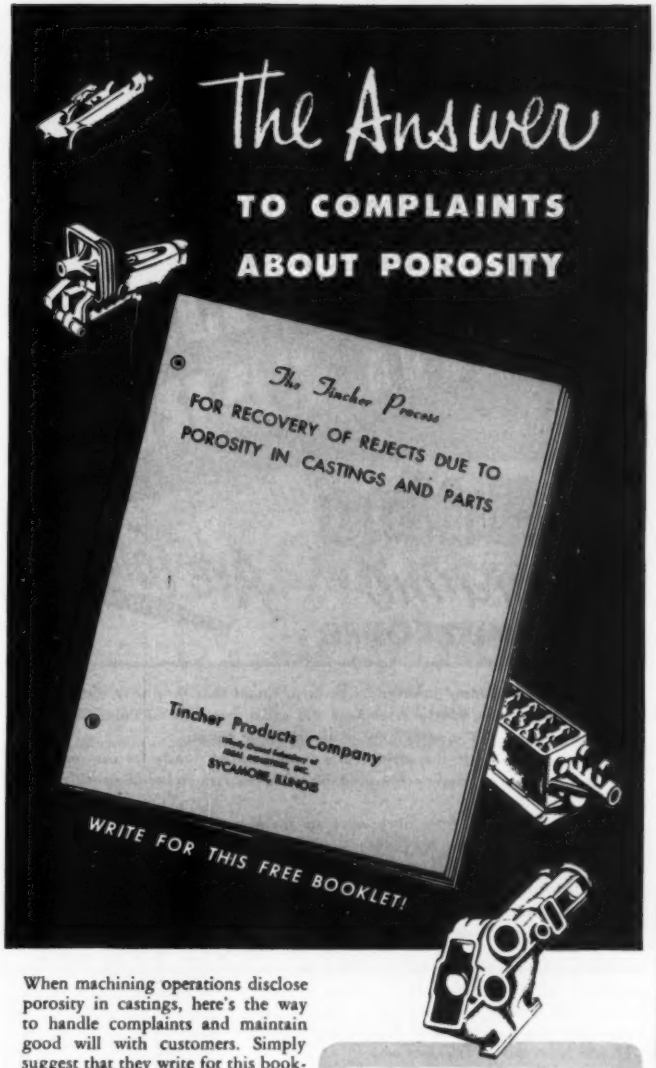
G. R. Casey

ings Co., Inc., Tulsa; **C. L. Snowdon,** Reliance Steel Co., Pittsburgh; **Carl F. Barchfeld,** Commercial Steel Casting Co., Marion, Ohio; **R. C. Harvey,** Key Co., East St. Louis, Ill.; and **J. Douglas Geneger,** Pacific Steel Casting Company, Berkeley, Calif.

Thomas Cornils has been named chief engineer for Link-Belt Co.'s Pacific Northwestern Division and will make his headquarters at the company's plant in Seattle. A graduate of the University of Washington in 1928, Mr. Cornils joined Link-Belt shortly afterward as an engineering draftsman in the Seattle office. He succeeds Homer J. Foye, who has been appointed chief engineer of Link-Belt Company's Los Angeles plant.

John F. Thompson, president of the International Nickel Co. of Canada, Ltd., was recently elected to the additional office of chairman of the Board of Directors at a special board meeting called following the death of Board Chairman **Robert Crooks Stanley.** Simultaneously, **Dr. Paul D. Merica,** executive vice-president and a director of the company, was elected a member of the Executive and Advisory Committees of the company.

Britain's Institute of Metals recently honored three of its members with medal awards—the Platinum Medal to **Dr. Randolph William Diamond,** Consolidated Mining & Smelting Co. of Canada, Ltd., Trail, B. C., Canada, for "outstanding services to the non-ferrous metal industries;" the W. H. A. Robertson Medal to **Christopher Smith,** James Booth & Co., Ltd., Birmingham, England, for a paper



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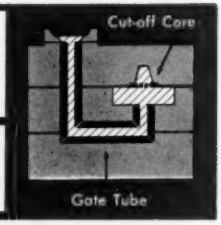

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on *"The Extrusion of Aluminum Alloys;"* and the Walter Rosenhain Medal to **Prof. Geoffrey Vincent Raynor** of the University of Birmingham, England, for "outstanding contributions in the field of physical metallurgy."

William E. Harvey, formerly plant manager in charge of Carbon and Graphite Products for Speer Carbon Co., St. Marys, Pa., has been named vice-president in charge of Carbon and Graphite Products. He was formerly plant manager for International Graphite & Electrode Corp., Niagara Falls, N. Y.

Dr. Ivor E. Campbell, known in the metallurgical field for his research on the preparation of metals by vapor-phase deposition, has been named supervisor of research on chemical problems in nonferrous metallurgy at Battelle Memorial Institute, Columbus, Ohio. Dr. Campbell has been a member of Battelle's staff since 1943 and is past secretary-treasurer of the Electrothermic Division of the Electrochemical Society. Simultaneously, it was announced by Battelle authorities that **Dr. Robert I. Jaffee** will be the new supervisor of research in non-ferrous physical metallurgy. Dr. Jaffee, who specializes in the technology of refractory, precious and low-melting rare metals, will guide Battelle investigations on the properties of less-familiar metals and alloys.

Sol L. Jacobson was recently elected president and treasurer of Union Malleable & Manufacturing Co., Ashland Malleable Iron Co., and Union Brass and Copper Co., at a meeting of the companies' board.

R. L. Prain, chairman and managing director of Rhodesian Selection Trust, Ltd., and several other international organizations has been elected as director of International Nickel. Mr. Prain is a resident of London, England.

Harry W. Jobes was recently appointed assistant to the president, United States Radiator Corp., Detroit, and will have charge of the newly-expanded Light Metals Division of the Corporation. A graduate of New York University, Mr. Jobes served as a major in World War II.

Osborne J. Stoudt, formerly sales representative, has been named sales manager of the Los Angeles Division of the Brumley-Donaldson Corp. Formerly with General Metals Corp., Los Angeles, Mr. Stoudt joined Brumley-Donaldson in 1946 following his discharge as a medical corps officer.

Wallace B. MacGregor, who joined Hunt-Spiller Mfg. Corp., Boston, last November as a stock room clerk, has been named materials control supervisor.

Walter C. Kell has been named assistant superintendent in charge of smelting operations, and **Joseph D. Allen, Jr.,** assistant superintendent in charge of manfacturing at Federated Metals Division, American Smelting & Refining Co.'s New-

ark plant. Mr. Keil received his master's degree in metallurgical engineering from the Colorado School of Mines in 1947, and Mr. Allen received his master's degree in metallurgical engineering from the Missouri School of Mines in 1948.

Dickey Dyer, formerly with Dyer Engineers, Inc., Cleveland industrial management consultants, has joined the Work-Factor Co., management consultants, New York, as director of new business activities. Mr. Dyer, who will make his headquarters in Cleveland, has been closely associated with the foundry industry for several years in a wide range of consulting management engineering services.

Walter L. Seelbach of Superior Foundry, Inc., Cleveland, National Vice-President of the American Foundrymen's Society recently spoke on the foundry as a career for the college graduate at the Second All-University Career Conference, held February 26-March at the University of Illinois, Urbana, Ill. Outstanding men from business and professional fields were selected by the Conference to speak on careers in their particular fields. Purpose of the Conference is to interest first-year students as well as upperclassmen in planning their futures, at a time when studies may still be altered to conform with a definite vocational aim.

OBITUARIES

J. J. McClain, 38, chief foundry engineer, Light Alloys, Fabricast Division, General Motors Corp., Bedford, Ind., died of a heart attack February 1. A graduate of the University of Detroit in 1933, Mr. McClain was first employed as a chemist and physicist in Ford Motor Co.'s Rouge Plant, River Rouge, Mich., later becoming an investigator for the State of Ohio. In 1939, Mr. McClain joined GMC's Delco-Remy Division, Anderson, Ind., as a chemist and metallurgist, becoming chief foundry engineer for GMC's Fabricast Division, his position at the time of his death, in 1945. Just prior to his death, Mr. McClain authored the January, 1951, AMERICAN FOUNDRYMAN article *"Modern Foundry Methods—Plaster Molding for Precision Casting Put on a Production Basis."*

Col. Earl D. Payne, 47, was buried in Arlington National Cemetery, February 9 with full military honors. A member of the general staff of the Army and industrial liaison officer for the Munitions Board, he died February 6 after a coronary occlusion. He succeeded Col. Frank H. Holmes as liaison officer in May 1950 and had worked with a number of advisory committees including the Foundry Industry Advisory Committee. Col. Payne graduated from the University of Cincinnati and before entering the Army in 1940 was for a number of years a lighting engineer for the Cincinnati Gas & Electric Co. In 1942 he was assigned to the statistical branch, Office of the Chief of Ordnance, Washington. Stationed in Japan in 1946, he returned in 1948 and studied for a year at the Industrial War College, Fort Lesley J. McNair.

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LITERATURE

(Continued from Page 156)

Core Testing and Control

94—Vol. 3, No. 2 of the *Foundryman's News Letter* contains detailed information on the testing and control of baked cores, describing recommended baking, storage, assembly and handling practices and such core properties as hardness, tensile strength, transverse strength deflection, permeability and core paste strength. Also described are Dietert sand testing apparatus and Dietert laboratory facilities available to the foundryman. Diagrams and photographs illustrate the text. *Harry W. Dietert Co.*

Ferrous Castings

95—Folder No. 10 provides a ready reference sheet on ferrous castings, including gray iron, pearlitic malleable, malleable and steel. Physical properties, advantages and applications of each type of casting are listed in comparative charts. Folder also serves as an introduction to iron and steel castings for engineering students and for plant production personnel. *Belle City Malleable Iron Co.*

Materials Handling

96—"Key to Lower Costs," a 36-page illustrated brochure, describes the complete line of Logan Conveyors, citing 24 case histories wherein industrial organizations have effected savings in materials handling costs; 16 typical handling solution sketches, showing flow production lines, 12 line sketches illustrating functions of principal types of conveyors; and 50 actual installation views. Also given are suggestions on how to increase productivity of the individual and his equipment, how to offset rising costs, and how to meet demands for better quality and faster deliveries. *Logan Co.*

Metal Shaper

97—Bulletin on Delta-Milwaukee 7-in. precision shaper gives complete specifications, catalog listings and illustrations of the machine's features. Other illustrations show entire unit in detail and applications. Also shown is a portable cabinet, available as optional equipment and enabling unit to be moved easily about the shop. *Delta Power Tool Div., Rockwell Mfg. Co.*

Dust Control

98—Detailed selection, operation and maintenance data for the plant engineer responsible for dust control is contained in a 50-page, digest-size booklet, "Industrial Dust Control Through Exhaust Systems." Illustrated with 15 photographs and 10 line drawings, the book describes exhaust hoods and piping systems, dust collecting equipment, and exhausters and drives. Introductory chapters list six basic methods of dust control, tells why improperly planned installations do not perfrom their functions. *Pangborn Corp.*

Thermal Riser Compound

99—Thermit Riser Compound, an exothermic material for eliminating piping in risers of castings, is described in a 12-page illustrated folder. Listed are such advantages as promoting directional solidification, elimination of special designs, increase in capacity, and savings in metal and sand. Detailed cross-section of mold shows how compound works. Also shown are chemical specifications of metals produced with Thermit Riser Compound, and data for its use in mild steel, cast iron and stainless steel. *Metals & Thermit Corporation.*

"Wet Water"

100—Wet Water and its possibilities in a variety of industries is the subject of a folder which provides a layman's description of the fundamental facts and highlights contributing to the money-saving application of the Aquadyne Wet Water System, which makes an economic supply available without elaborate equipment. Listed are such foundry applications as dust control, sand mixing and blending, core knockout and core wash sand conditioning tempering. *Aquadyne Corp.*

Boosters

101—Practical advantages and applications of Dual-Pressure Boosters, postwar-developed and manufactured from standard air and hydraulic cylinder components, are listed in an informative 4-page

(Continued on Page 176)

• CHEMICAL ANALYSES OF ALL METALLURGICAL MATERIALS

• SPECTROCHEMICAL ANALYSES
Qualitative and Quantitative

• PHYSICAL TESTING

• MICROSCOPIC EXAMINATIONS AND PHOTOMICROGRAPHS

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Permtester—A foolproof method for determining sand permeability.
Transverse Test Core Maker—For preparing core specimens for transverse tests.
Transverse Core Tester—Rapidly determines transverse strength of dry sand cores.
Baking Oven—Electrically heated, dries sand samples, bakes core specimens.
Moisture Tester—A reliable method of measuring moisture content.
Sand Mixer—For thorough preparation of sample core-sand mixtures.
Sand Washer—The easy-to-use method to determine clay content of sand.

Each of these testing units was designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

Complete information upon request.

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LITERATURE

(Continued from Page 174)

editorial reprint. Circuit drawing, illustrations and a detailed description of typical practical applications are presented to point up such advantages as savings in air consumed, savings on circuit valves and convenient adaptability in circuits of small-to-medium volume requirements. Single pressure boosters for small volume requirements, methods of returning booster-driven hydraulic cylinder and simplicity of maintenance by present personnel are also discussed. *Miller Motor Co.*

Oxy-Acetylene Metalworking

102—Contributions of the oxy-acetylene flame to progress of industry is outlined in a new 16-page booklet, "Oxy-Acetylene Flames and Metalworking—A Story of Industrial Progress." Booklet, written in layman's language, traces the history of the oxy-aceteylene flame and explains how industry is using it today in cutting, welding and heating operations. Such specialized jobs of the flame as hard-facing, flame-softening, flame-hardening, powder cutting and steel conditioning are briefly described. *Linde Air Products Co., Division of Union Carbide & Carbon Corp.*

Locomotive Cranes

103—Four-page brochure describes application of a torque converter combined with fluid clutch to a locomotive crane. Unit automatically provides correct torque in the exact amount needed to move the load, enabling operator to move load up and down fractions of an inch at a time. Eliminates shock loading on gears, "slip-clutching" at full throttle to start heavy loads, etc. *Orton Crane & Shovel Co.*

Welding Alloys

104—Four-page folder gives purchasing data on welding, brazing, soldering, cutting and tinning alloys and flues. All details that a buyer or purchasing agent must know to make proper selection and enter orders are covered in this booklet. *All-State Welding Alloys, Inc.*

Inventory Control

105—40-page booklet, "Production Control in Manufacturing Industries," gives quick, accurate answers to production control problems and offers remedies for production bottlenecks before they become acute. Explained are general production control, scheduling defense orders, processing production orders, and meeting delivery dates based on correct information on raw materials and machine facilities. *Remington Rand, Inc.*

Parting Compound

106—Bulletin 427, "Colloidal Graphite as a Parting Compound," describes how these dispersions apply to many industries in parting of sintered metal clutch plates from each other, separation of ingots from molds, etc. A unique lubricant, unaffected by heat up to 3200 F in inert atmospheres, dag colloidal graphite is used to prevent sticking, corrosion, galling and freezing of parts and is particularly effective on screw threads of bolts and nuts. Treated threads can be drawn up tighter with less effort with the application of colloidal graphite. *Acheson Colloids Corporation.*

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CHAPTER ACTIVITIES

(Continued from Page 166)

which require time to wash out of the gating system. Experiments with variously designed sprues, sprue bases, gates and runners illustrated the most effective designs to eliminate or minimize defects caused by gas aspirations and entrapment.

The membership were very appreciative of Mr. Massari's visit, and exhibited their interest in the evening's subject by questions at the conclusion of the presentation.

Rochester

Donald E. Webster
American Laundry Machine Co.
Chapter Reporter

PRINCIPAL SPEAKER at the March 6 meeting was Richard Herold, Foundry Products Dept., The Borden Co.

Some 65 foundrymen and their guests heard Mr. Herold outline fundamentals of the shell-molding process, which he followed step-by-step—from building of the pattern, which he said must be of finest quality, through application of resin-sand mixture to the heated pattern plate, curing period, stripping of shell sections—to the point where sections are clamped together and backed up with steel shot in a suitable flask or other container, and are ready for pouring of molten metal.

The fact that castings can be made to the closest of tolerances, together with the high quality surface produced, has opened up a new field for this type of mold, Mr. Herold said, and already the automotive, aviation, and diesel engine industries have found the process well adapted to the making of small castings, where production is large per pattern. In many cases, due to the accuracy of the process, machining may be eliminated entirely, or grinding may be resorted to in meeting the finest tolerances.

A number of interesting points were stressed. Since the actual shell may be less than a quarter-inch in thickness, the consumption of resin is held to a minimum. The shells when formed and properly cured have no tendency to absorb moisture, and so may be stored for long periods. The highly permeable character of the molds allows the ready escape of gas, and surface quality is such that cleaning is largely avoided. Gating and risering are not of the conventional type, but when designed are included in the pattern plate. Core blowing may be resorted to, to produce shell cores of the same resin bonded material, followed by the proper curing treatment, Mr. Herold stated.

Further studies of resin binders, suitable sands, pattern equipment, and other details are under way, but shell molding is now being used as a production method in a variety of applications and with all of the regularly cast metals, the speaker concluded.

Twin City

O. J. Myers
Archer-Daniels-Midland Co.
(The Werner G. Smith Co. Division)
Chapter Reporter

AN EXCELLENT SPEECH on *"Modern Quality Control in Aluminum Foundries"* was given before more than 50 foundrymen at the March 13 meeting by John J. Stobie, Jr., of the Apex Smelting Co., Chicago.

Setting up quality control is not enough, according to the speaker. Vigilance on the part of all foundry personnel coupled with rigid adherence to rules without any deviation is also of the utmost importance in foundry control. The starting point for control, he said, is the metal itself. Absolute knowledge of the metal analysis is imperative at all times.

(Continued on Page 179)

FOUNDRY FIRM *Facts*

Assets and business of **Austin-Western Co.,** Aurora, Ill., became a part of the **Baldwin-Lima-Hamilton Corp.,** Eddystone, Pa., on March 8, according to an announcement by Marvin W. Smith, president, and G. A. Rentschler, board chairman, of the Pennsylvania corporation. Austin-Western will continue to serve its customers under its own name.

Purchase of **Armstrong-Whitworth & Co., Pneumatic Tools, Ltd.,** Gateshead-on-Tyne, England, has been announced by Neil C. Hurley, Jr., president, **Independent Pneumatic Tool Co.,** Aurora, Ill. The English company and plant now become an affiliate of Independent Pneumatic Tool Co., Ltd., London, a subsidiary of the Aurora company which operates plants in Aurora and Los Angeles, 20 branches in the United States and Canada, Thor Tool Hemisphere, Inc., Sao Paulo, Brazil, and Thor Tool Continental, Inc., Antwerp, Belgium.

The **Fiat Mirafiori Plant,** Turin, Italy, has completed installation of two high production molding systems, involving sand conditioning, molding, conveyor lines, and modern shakeout and casting cleaning equipment in its iron foundry under the supervision of G. W. Merrefield, foundry engineer, **Giffels & Vallet, Inc.,** Detroit. Fiat is reported to have the most modern production foundry in Europe. Constructed in 1949, the plant produces cylinder blocks and miscellaneous castings iron for the Fiat car, using equipment designed by Giffels & Vallet, International, Inc.

Fire of undetermined origin destroyed the main building of **Alloy Engineering & Casting Co.,** Champaign, Ill., March 10, causing a loss estimated at several hundred thousand dollars. About half the steel work is gone according to H. H. Harris of the company. Furnaces, core ovens, and a large part of the cleaning and pattern shop equipment, and molding machines are being repaired. Laboratory, offices, machine shop, main pattern storage, power plant, and transformers were undamaged. Some operations on a limited scale have been resumed in rented space and a night shift of Alloy Engineering men is being run at General Alloys Co., Boston.

Kordell Industries (formerly Trabon Co.), with offices in Chicago, is transferring core oil manufacturing operations from South Bend, Ind., to Mishawaka, Ind., where a new building to house laboratory and production facilities will be completed in June. The company has developed fast-baking core oils that in some cases shorten baking time by as much as 50 per cent, according to N. L. Mooneyham, president. Others in the company are George A. Meisinger, vice-president and plant manager, John C. Lunkes, secretary and buyer, and V. M. Rowell, laboratory, plant, and foundry contacts.

The 106-year old **Barnet Foundry & Machine Co.,** Irvington N. J., has acquired another foundry in Dover, N. J. Equipment modernizations and replacements have been completed and the foundry is in operation.

Plans for approximately 12 million dollar expansion of **General Refractories Co.,** Philadelphia, have been announced by Floyd L. Greene, president. Now operating 13 mines and 29 plants in the United States and Europe, the company is building a new plant at Morrisville, Pa., is enlarging its Baltimore Works by 25 per cent, and is constructing a new plant in Los Angeles three miles west of its Vernon Works to double its West Coast production.

Metallurgical Advisory Board, newly-formed of leading industrial and academic metallurgists, will advise the Research and Development Board of the Department of Defense on research aspects of some of the nation's most critical metals. Within limits of specific problem assignments, the metallurgists are to advise the Board on the correlation, coordination, interpretation of metals research and development programs conducted or sponsored by the military services, suggest new research projects or reorientation of existing research, and gather metallurgical information from technical societies and organizations. Among metals in critical short supply listed for study are columbium, tantalum, cobalt, titanium, molybdenum, tungsten and beryllium. Dr. Robert F. Mehl, Carnegie Institute of Technology, is chairman of the Advisory Board, which includes prominent research metallurgists from leading engineering schools and colleges, Government research organizations, and from some of the nation's most prominent firms in the metals industry and allied industries.

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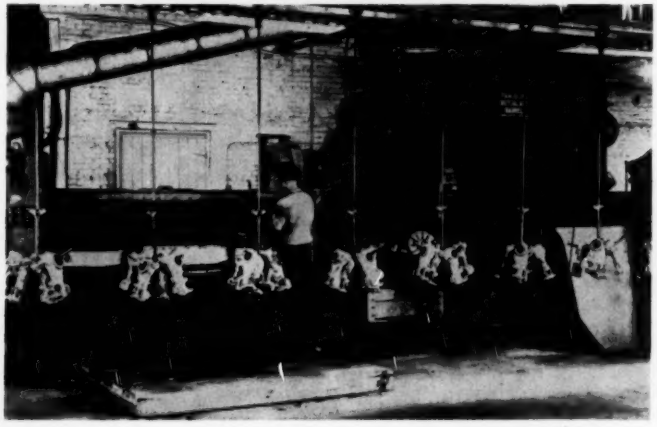

Straight-line layout of the cleaning room at the new Fairbanks-Morse Freeport Works enables one man to clean 2500 castings in an 8-hr day. Equipped with a blasting table and a rocker-barrel, the room receives castings from an overhead conveyor system direct from the shakeout. Castings range from 2 oz. to 120 lb (average 10 lb), the larger being picked off the conveyor by the operator and placed in the skip of the automatic loader of the barrel. Flat castings or fragile parts which might be damaged by tumbling go onto the table. The revolving platform of the table is set for 3¼ min per revolution and each casting passes through the centrifugally propelled stream of abrasive twice, once on each side. The castings are cleaned in the barrel in from five to seven minutes.

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CHAPTER ACTIVITIES

(Continued from Page 177)

Aluminum alloys must be chosen for the majority of their beneficial characteristics since any one alloy will not satisfy all requisites, according to Mr. Stobie. Alloys cannot be changed indiscriminately without regard to gating, risering, and feeding systems since their metal flowability differs from one composition to another.

Mr. Stobie stressed the necessity for using clean solid scrap. If borings and turnings are to be melted, he said, they should first be pigged and then analyzed. Fluxing of molten aluminum with either gaseous or solid type flux is most important. If a liquid flux be used, small amounts should be stirred in and the surface of the melt watched carefully. As soon as the dry powder ceases to form, the fluxing is adequate.

Aluminum foundry practice was divided during the last war as follows: 60 per cent Sand Casting; 20 per cent Permanent Mold; 20 per cent Die Casting. At the present time all phases are nearly equal, the speaker said.

Some fluxing methods tend to coarsen the grain of the metal, therefore titanium, boron, zirconium and sometimes sodium are used to counteract this effect, he said. Sodium is especially desirable in high silicon alloys.

The speaker stressed the need for temperature control on the melting floor with special emphasis on keeping the melt at as low a temperature as possible. Small capacity melting equipment tends to "overshoot" much more rapidly than larger design.

In conclusion, Mr. Stobie spoke at length regarding the necessity for good housekeeping, which not only makes the foundry a good place in which to work, but also aids immeasurably in fostering quality control.

Schedule Malleable Market Development Conference

DEVELOPMENT AND MOBILIZATION will be themes of the Market Development Mobilization Conference for executive and sales personnel of the malleable castings industry, April 19-20 at Troy, N. Y.

Jointly sponsored by the Malleable Founders' Society and Rensselaer Polytechnic Institute, the Conference will open with a discussion *"What Do We Have to Sell?"* Thursday morning, April 19. After luncheon, afternoon's program will be devoted to *"How We Look to the Customer"* and in the evening will be a dinner meeting.

April 10 program will consist of discussion of *"New Business,"* a luncheon meeting, and the afternoon's program will cover *"Summarization and Inspiration."*

Registration, accommodations and program details are available from the Malleable Founders' Society, 1800 Union Commerce Bldg., Cleveland 14, Ohio.

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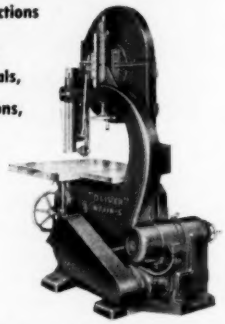

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(Continued from Page 83)

are two important considerations in heat treatment. He described types of furnaces and said that speed of heating varies directly from radiation, to convection, to conduction types; uniformity varies inversely with heating rate in any type of furnace. Session chairman was H. A. Schwartz, National Malleable & Steel Castings Co.

Steel foundrymen, declared T. N. Armstrong, International Nickel Co., New York, in a steel group meeting, can meet exacting specifications with low sulphur, minimum oxide content achieved through careful melting, proper balance of alloy and carbon content, and precise control and heat treatment. Meeting chairman was C. B. Williams, Massillon Steel Castings Co., Massillon, Ohio.

In the second round of morning meetings speakers and their topics were: pattern, Franz Schumacher, *"Plastic Match Plates;"* gray iron—John B. Caine, Cincinnati, *"Time—the Basic Foundry Problem;"* non-ferrous, W. B. George, R. Lavin & Sons, *"Foundry Practice for the Molding of Copper Alloys;"* malleable, Ray A. Witschey, A. P. Green Fire Brick Co., Chicago, *"Basic Approach to Malleable Refractories;"* and steel, Robert A. Willey, Commercial Steel Casting Co., Marion, Ohio, *"Practical Risering of Gears."*

Mr. Schumacher described production and use of plastic matchplates. Ease of drawing, freedom from mold tearing, and resistance to wear were among the advantages he brought out. James J. Martin, Royal Pattern Co., Cleveland, was chairman of the meeting. Fundamental concepts of time in melting, pouring, solidification, and extraction of heat by mold materials, were covered by Mr. Caine. Presiding at his session was Ray Redmond, Buckeye Foundry Co., Cincinnati.

Mr. George discussed methods of calculating costs of production for brass and bronze castings and called on each foundry to establish its own sound methods for arriving at a true casting cost by including such factors as hazard. This, he said, is often overlooked and will vary with the type of casting, production method, and number ordered. C. E. Eggenschwiler, Bunting Brass & Bronze Co., presided.

In malleable casting production, said Mr. Witschey, the alumina-silica group of refractories is the most important. He described production of refractory brick and reviewed the conventional refractory tests such as fusion, spalling, load resistance and deformation, and slag resistance. Chairman was John Manos, Lake City Malleable Co.

Mr. Willey described a method for

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calculating riser size using surface area-volume relationships of a 1-in. section of the part of the casting to be fed. Assuming the use of a cylindrical riser of height equal to diameter in all cases, he showed how to calculate riser diameter as the ratio of 5 to the freezing rate of the 1-in. section. The freezing rate is determined, he said, by dividing the surface area of the 1-in. section by its volume. His method, he pointed out, gives only riser size, not number and location. He allows a ½ to 1 in. safety factor. Presiding was Michael Bock, II, Exomet, Inc., Conneaut, Ohio.

The conference ended with a lunch and a humorous talk by Henry Pildner. Significance of his entertaining remarks were as much a mystery to the speaker as they were to his audience.

In addition to Conference Chairman Kelly and Conference Secretary Walter, the following Cleveland foundrymen participated in planning and carrying on the conference: Howard E. Heyl, Federal Foundry Supply Co., *registration;* Thomas W. Gallagher, Lake City Malleable Co., *housing;* F. Ray Fleig, Smith Facing & Supply Co., *finance;* and Charles F. Walton and Edward J. R. Hudec, Case Institute of Technology, *Case participation.*

Division chairman in charge of the program for the various industry interests were: James J. Martin, Royal Pattern Works Co., Cleveland, *pattern;* A. Wm. Schneble, Advance Foundry Co., Dayton, Ohio, *gray iron;* H. G. Schwab, Bunting Brass & Bronze Co., Toledo, *non-ferrous;* D. C. Williams, Ohio State University, *malleable iron;* and T. W. Harvey, Sr., Pitcairn Co., Barberton, Ohio, *steel.*

Automatic Control Film Available

PICTORIALIZED LECTURE technique is utilized in a newly-released, 55-minute, 16mm full color and sound motion picture, "*Principles of Automatic Control.*"

Produced as one of the Society's educational projects, the film is designed to present the subject of automatic control to students, technical personnel, instrument mechanics and production men.

Educational institutions and members of the Instrument Society of America may borrow the film without charge. Other societies will be charged $5 per showing and companies $10 per showing to cover packing, shipping, inspection and maintenance costs, and copies are purchasable by schools and companies for training programs at $500 each.

"*Principles of Automatic Control*" comes in two reels, the first 800 ft long and the second 1200 ft long. Total time of showing of both reels is 55 minutes.

A leaflet describing the film and showing typical scenes is available without charge from the Instrument Society of America, 921 Ridge Ave., Pittsburgh 12.

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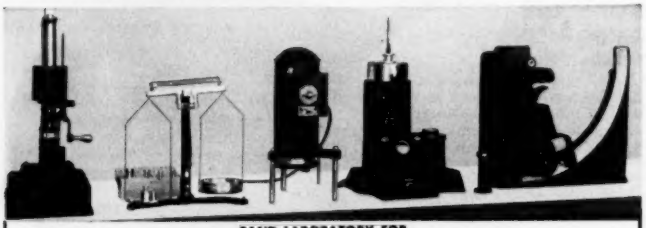

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LETTERS TO THE EDITOR

(Continued from Page 107)

differ considerably but we don't pay much attention to them. In research work it is always important to look for one thing at a time.

Knowing the best addition alloys for low sulphur iron as may be produced with the basic-lined cupola, it will be very easy to systematically produce nodular iron within composition limits corresponding to a pearlitic, a ferritic, or an intermediate matrix as cast. It seems probable that nodular iron with 90,000 to 100,000 psi tensile strength may be produced regularly by the calcium-magnesium process.

J. E. Rehder has commented that the tensile strengths of the calcium-magnesium nodular irons seem to be consistently somewhat lower (especially in the annealed or completely ferritized state) than those of the straight magnesium irons with normal residual magnesium of 0.04-0.08 per cent. We must consider here the matrix strengthening effect of the residual magnesium. A second reason is that the spherulites in the calcium-magnesium irons are not so perfectly shaped, a fact which also explains the average lower elongation of the completely ferritized irons produced by the calcium, calcium-magnesium, or calcium-lithium process.

Finally, it should be mentioned that the somewhat lower average strength corresponds to a lower Brinell hardness and it is believed that the calcium-magnesium nodular irons have much better machinability than the straight magnesium nodular irons.

Our conclusions to date should be considered provisional. Much more experimental work is necessary to make them more specific and it is hoped that further results will be available by the International Foundry Congress to be held in Brussels, Belgium, September 10-14, where the writer hopes to see a great many foreign colleagues and friends.

ALBERT L. DE SY, *Prof.*
University of Ghent
Ghent, Belgium

Italian Foundryman Appreciates Foundry History

The following letter was sent to Bruce L. Simpson, National Engineering Co., Chicago, in care of National Office, American Foundrymen's Society.

I have read with very great interest and profit your book DEVELOPMENT OF THE METAL CASTINGS INDUSTRY. In congratulating you on your contribution to the history of metallurgy and particularly to the development of the foundry industry in the New World, I express appreciation for the recognition you rightly gave to Italian foundrymen such as Biringuccio, Leonardo da Vinci, and Cellini. They can be called the heirs of Etruscan cleverness in foundry art.

DR. BRUNO BONI
Milan, Italy

ABSTRACTS

Abstracts below have been prepared by RESEARCH INFORMATION SERVICE of The John Crerar Library from current American and foreign literature. For literature searches and translations of technical, industrial, and scientific literature, and photostats and microfilm, write to: Research Information Service, The John Crerar Library, 86 East Randolph Street, Chicago 1, Illinois. Rates for above services given on request.

Designing Steel Castings

A107—CONSIDER METAL CHARACTERISTICS. Charles W. Briggs, "Good Steel Casting Design Improves Quality and Reduces Costs," *Materials and Methods*, vol. 33, Feb. 1951, pp. 68-71.

Designing specifically for steel castings, keeping in mind their inherent characteristics, will often eliminate unnecessary weight, reduce cost of production, and offer better service properties. Such steel characteristics as low fluidity, low strength at 2700 F, high shrinkage, and high cooling stresses are important points to be considered in casting design. The use of inscribed circles to determine the size of a hot spot in the casting (a source of trouble) and the importance of mass effect is discussed. Safety factors, minimum section thicknesses and dimensional tolerances are factors which also have to be carefully considered before the final design of the casting is arrived at. Two tables and five figures are included.

Ferrous Refractories

A108—PROPERTIES AND APPLICATIONS. G. Reginald Bashforth, "Some Trends in Iron and Steel Works' Refractories," *The Refractories Journal*, No. 12, Dec. 1950, pp. 512-527.

A wide range of refractories, their properties, composition, use, and expected life are discussed. Quantitative information on the properties and composition of various refractories is presented in two tables. The properties of three types of ladle bricks are tabulated.

Steel Cast Continuously

A109—HIGH YIELD OBTAINED. Isaac Harter, Jr., "Continuous Casting of Steel," *Journal of Metals*, vol. 3, March 1951, pp. 223-226.

Developments in continuous casting of steel are being made jointly by Republic Steel Corp. and Babcock and Wilcox Tube Co. Circumventing ingot casting, soaking pits and the blooming mill, castings can be made directly from the melt. The basic requirements of the process, the equipment used and the results of experimentation are discussed. The castings furnished maximum casting strength.

Applying Ductile Cast Iron

A110—CONSISTENT PROPERTIES OBTAINED. N. Croft, "Producing Ductile Cast Iron," *Iron and Steel*, vol. 24, Feb. 1951, pp. 45-50.

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of ductile cast iron having magnesium additions are discussed. Tests conducted on ductile cast iron show that through close control of the process this material can be made satisfactorily and with consistent properties. A table comparing the mechanical properties of cast irons having pearlitic and ferritic matrices is presented. A number of photomicrographs show the structures of cast iron before and after the magnesium treatment. Many items made from ductile cast iron are illustrated.

Investment Casting

A111—Design Factors. R. L. Wood and D. Von Ludwig. "The Fields of Utility of Investment Castings," *Mechanical Engineering*, vol. 73, March 1951, pp. 191-197.

The authors discuss factors to be considered when designing parts for investment casting, and the criteria for choosing the proper alloy. Many illustrations are presented of castings made by this process. Some of these parts have formerly been cast by other processes and some cannot be cast by any other method. Five examples of parts embodying various design errors which made the parts unsuitable to the investment process are discussed and illustrated.

Flat Shape Continuous Casting

A112—Method Covers Various Metals. D. I. Brown, "Continuous Casting Process Employs a Moving Mold," *The Iron Age*, vol. 167, Jan. 25, 1951, pp. 53-55.

Water-cooled steel bands traveling over drum pulleys form the mold in the latest continuous casting machine developed by the Hazelett Strip Casting Process Co. The process appears to be well suited for the continuous casting of flat shapes in aluminum; the old troubles of segregation and folding encountered with older Hazelett models have been eliminated. There is more work to be done on methods of introducing the metal into the mold. The possibility of extending the process to the casting of steel slabs is being investigated; brass has already been tested and magnesium casting appears to have good possibilities.

Investment Casting Alloys

A113—Castability Factors. Rawson L. Wood and David V. Ludwig. "How to Select Nonferrous Alloys for Investment Castings," *Materials and Methods*, vol. 33, Jan. 1951, pp. 78-82.

The choice of alloy to be investment cast is the most important controllable variable that must be considered in designing a new product or part. The inherent castability properties predetermines whether the castings will be uniform, strong, clean, dense, fine grained, etc. Factors affecting the castability of alloys are briefly outlined. Recommendations and discussions are presented on the suitability of types of magnesium, aluminum, and copper alloys for investment casting.

Cast Steel Properties

A114—Homogenization Effect. A. Hartley, "Steel Castings—a Review of the

Literature on Homogenization," *Iron and Steel*, vol. 23, Dec. 1950, pp. 511-514.

The author discusses information found in recent literature concerning the effect of homogenizing on the properties of cast steel. Mechanical properties, hardenability, weldability, temper brittleness, structure of the steel, ballistic values, and quench cracks are covered.

Ductile Iron Data

A115—Properties and Applications. A. P. Gagnebin, "The Industrial Status of Ductile Iron," *Mechanical Engineering*, vol. 73, Feb. 1951, pp. 101-108.

A report of the progress made thus far on ductile iron is presented. The properties obtained, the castings being made, and some future possibilities are discussed. The relation between tensile strength, elongation, and hardness of ductile iron in as-cast condition is shown graphically. The mechanical properties, U. S. specifications, composition range, and machinability data are presented in tabular form.

Magnesium Alloys

A118—Aging Treatment and Properties. T. E. Leontis and C. E. Nelson, "The Aging of Sand-Cast Mg-Al-Zn Alloys," *Journal of Metals*, vol. 191, Feb. 1951, pp. 120-124.

A comprehensive survey is presented on the changes in tensile properties, microstructure and dimensional stability of two magnesium alloys, AZ92A and AZ63A, as a function of aging time and temperature after solution heat treatment. Suitable aging treatments render these alloys dimensionally stable to subsequent exposure at temperatures prevailing in engine applications.

Die Casting

A119—Pumps Are Holding Furnaces. Herbert Chase, "Die Casting Machines Fed Automatically," *The Iron Age*, vol. 167, Feb. 15, 1951, pp. 100-103.

An advanced setup for the precision die casting of airplane electrical equipment has been installed by the Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y. Electromagnetic pumps feed molten metal directly into the die casting machines, eliminating hand ladling. Two pumps act as holding furnaces, insuring a uniform, constant temperature supply of the molten metal to two cold chamber die casting machines.

Brass Die Casting

A120—Process Components, Procedure, Casting Defects. T. Van Der Klis, "The Gravity Die Casting of Brass," *Metalen*, vol. 6, Feb. 15, 1951, pp. 35-40.

Gravity die casting of brass items of 50-1000 grams in weight, and such components of the casting process as the die, the type of metal, the coating and the core (sand cores as well as metal cores) are described. The second section of the article outlines the casting procedure (size and number of runners, methods of pouring and the installation of a casting unit), while the third part deals with such casting defects as roughness and blow holes.

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